# Lessons for Lizards

## Understanding openSUSE

# Lessons for Lizards: Understanding openSUSE

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## Draft Version

This book is a draft. There might be errors, inconsistencies, typos and other broken things. If you want to contribute, please look at http://developer.novell.com/wiki/index.php/Lessons_for_Lizards for more information.

## Legal Notice

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# About This Book and *Lessons for Lizards*

*Lessons for Lizards* (LfL) is a community cookbook-style book project for the openSUSE distribution licensed under the GNU Free Documentation License (GFDL) [http://www.gnu.org/copyleft/fdl.html]. This book is intended to be shipped with upcoming openSUSE releases on an equal footing with internally produced documentation. Lessons for Lizards covers more specific or exotic topics than the internally produced manuals, such as

- Experimental software
- Third party software
- Third party drivers
- Complex setups (for example, a router for the home network)

# 1. Feedback

We want to hear your comments and suggestions about this manual. Feel free to leave your comments at  or write to our mailing list at <opensuse-doc@opensuse.org> (subscription required).

# 2. Authors

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# 3. Source Code

The source code of this book is publicly available through Subversion. To download the source code, proceed as outlined at http://developer.novell.com/wiki/index.php/Lfl/Subversion_Instructions. To build the book, see the directions at http://developer.novell.com/wiki/index.php/Lfl/Lessons_for_Lizards_Quickstart.

# 4. About the Making of This Manual

This book is written in DocBook [http://www.docbook.org]. The XML source files were validated by `xmllint`, processed by `xsltproc`, and converted into XSL-FO using a customized version of Norman Walsh's stylesheets. The final PDF is formatted through `fop` from Apache.

# Chapter 1. KDE

There should me more topics. Do you have an idea? If you want to contribute, please go to http://developer.novell.com/wiki/index.php/Lessons_for_Lizards.

# 1.1. KDE Configuration for Administrators

Frank Sundermeyer
Almost finished
$Revision: 212 $
$Date: 2007-02-22 17:21:45 +0100 (Do, 22 Feb 2007) $

KDE is an extensively configurable desktop environment. In addition to being configurable for the individual user, administrators have the possibility to create global configurations. This allows system administrators to provide custom default settings for their environments. Settings can differ between groups and individual users. It is also possible to restrict which settings users can change. Additionally, access to parts of KDE or functions in KDE can be restricted for users and groups.

These global configurations allow administrators to, for example, set up a network-wide desktop the user is not allowed to change. It is also feasible to assign task-specific profiles with access to only a limited set of applications to different groups within the network.

KDE reads and stores all configuration files in fixed directory trees called profiles. A profile is a collection of default settings and restrictions that can be applied to individual users or groups of users. These profiles are handled by the KIOSK framework. Use the graphical KIOSK Admin Tool to generate and manage profiles or manually edit and create files and structures in a profile.

## Requirements

To set up a global KDE desktop configuration for clients within your network, you need:

- `root` access to a server and to the clients in the network
- the KIOSK tool (pakage `kiosk`) installed on your workstation
- KDE 3.x - the procedure described here will most likely not work with older or future KDE versions

## Procedure

The Kiosk Admin Tool allows you to define profiles with desktop policies, environment restrictions, and menu definitions. It allows you to modify existing profiles and lets you assign them to groups and users. Kiosk also lets you automatically deploy profiles to a remote host.

Start the Kiosk Admin Tool from the KDE main menu or with Alt + F2 and the command `kiosktool`.

### Creating a New Profile

To create a new profile, click *Add New Profile*. In the dialog that opens, enter a *Profile name* and a *Short description*. You can also specify an owner to which the files of the profile should belong. The user specified here must have write access to the profile directory. You also need to know the password of the user specified here. See the section called “Deploying Profiles to the Local Machine” for more information about the profile directory.

It is possible to change the data entered here any time with *Profile Properties*.

## Setting Up a Profile

By choosing an existing profile and clicking *Setup Profile*, set up configurations for all KDE components, such as icons, menus, and file associations. After choosing a component, activate a restriction by checking the box of the respective entry. Choosing an entry with the mouse displays a help text explaining the effect the restriction has.

Entries either describe a specific feature that you can `disable` (such as *Disable Logout option*) or describe configuration options that you can `lock down` (such as *Lock down Screen Saver Settings*). By doing so, the feature or configuration option is not available when the profile is used.

Apart from disabling features and locking down configuration options, you can also configure the look and feel of the desktop itself. When selecting the components *Desktop Icon*, *Desktop Background*, *Screen Saver*, *KDE Menu*, and *Panel*, get two additional buttons—*Setup* and *Preview*. When clicking *Setup*, the desktop settings of the currently selected profile are loaded and temporarily overwrite your own desktop settings. Now you can make changes just as you would when configuring your own desktop. When you confirm your changes by clicking *Save*, the changes made are permanently added to the profile and your own desktop settings are restored.

## Assigning Profiles to Users and Groups

When you create a profile, it is not "active" by default. First assign it to users or groups first. *Assign Profiles* opens a dialog where you can assign all existing profiles to distinct users or groups. If you are applying more than one profile to a user or group, settings from all profiles are used. If a profile contains settings that conflict with settings in another profile, the settings in the earlier listed profile take precedence. The same rule applies if you apply a profile to a specific user and another profile to a group of which this user is a member.

### Users and Groups on Remote Hosts

You can assign profiles to groups and users available on the local machine. If you are planning to deploy your profiles to a remote server, make sure that the needed users and groups from the remote host are also available on the local machine (for example, by using NIS).

## Deploying Profiles

The KIOSK Admin Tool not only allows you to deploy profiles to the local machine, but also to a remote computer. In doing so, you can, for instance, deploy the profiles onto an NFS server from which they are exported to all clients on the network.

### Deploying Profiles to the Local Machine

If you are deploying your profiles to the same machine as the KIOSK Admin Tools is running on, no manual intervention is required—the tool takes care that the profiles are "found" on start-up. By default, all profiles are stored in  to which only the user `root` is allowed to write. It is recommended not to change this setting.

However, if you need to change the location to which the profiles are written, select *Settings* > *Configure KIOSK Admin Tool* and change the *Base directory*.

It is also possible, although not recommended, to distribute profiles to different locations. Uncheck *Store all profiles under the same directory* in the configuration dialog. Having done so, you must specify the *Directory for this profile* when creating a profile.

### Deploying Profiles to a Remote Machine

The KIOSK Admin Tool configuration (*Settings* > *Configure KIOSK Admin Tool*) lets you specify a location on a remote host to which to upload the profiles when exiting the tool. This upload mechanism uses the `fish` protocol. The *Server URL* field in the configuration dialog is initialized with `fish://root@host/`. Replace `root` with the user to which the files on the remote server should belong and `host` with the remote hostname. By default, the same directory as on the local host is used. To change this, click *Open file dialog* to specify a new directory

on the remote server. After entering the password for the remote user, you can browse directories. By default, the directory on the local host is appended to the *Server URL* specified. Use *Strip off* to change this.

By default, KDE expects its profiles in . If you are deploying them to this directory on a remote machine or to a directory on an NFS server that will be mounted with this path by the clients, no further interaction is required. Otherwise, adjust . See http://websvn.kde.org/trunk/KDE/kdelibs/kdecore/README.kiosk?view=markup for details.

## Example: Creating and Assigning a Profile

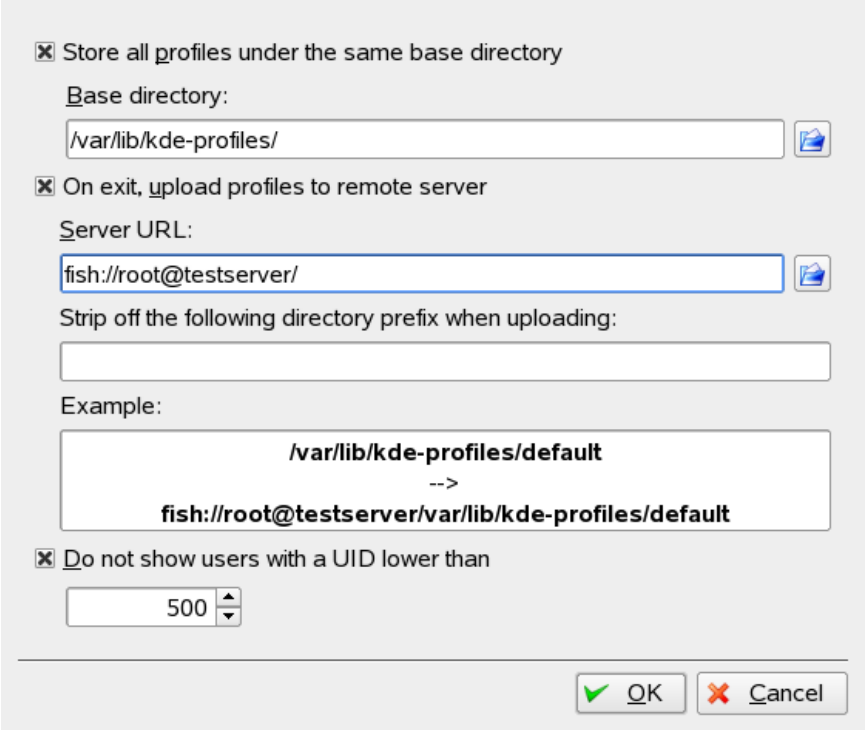
In the following example, a profile called myCompany is created and assigned to the user `tester` on the remote host `testserver`.

1. Start the Kiosk Admin Tool from the KDE main menu or with Alt + F2 and the command `kiosktool`.

2. Open the configuration dialog with *Settings* > *Configure KIOSK*. On the local machine, all profiles are stored in  by default. Also by default, users with a `UID` lower than 500 are not displayed.

   The profile in this example should be deployed to a remote host named `testserver` in the default profile location. Therefore, activate *On exit* and change the *Server URL* to `fish://root@testserver/`.

   **Figure 1.1. Configuring the KIOSK Admin Tool**




3. Open the *Add New Profile* dialog and create a new profile called `myCompany`.

**Figure 1.2. Adding a Profile**

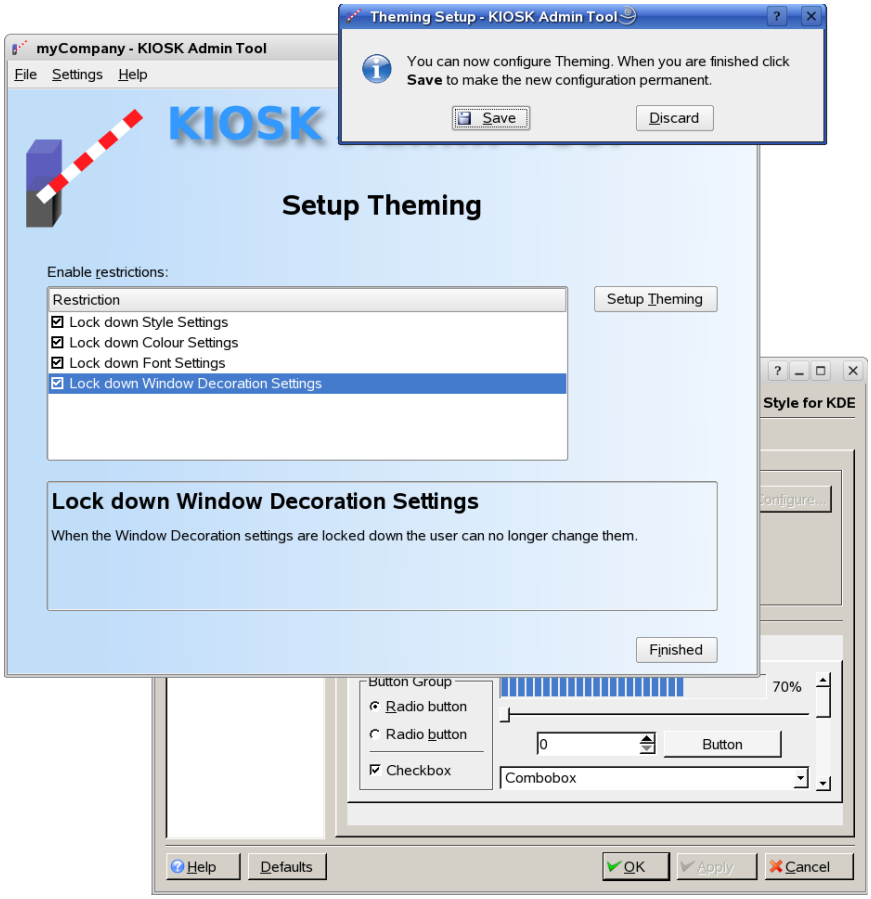

Click *Finished* to save the new profile. You are prompted for the `root` password before the files can be saved.

4. Clicking *Setup Profile* opens a dialog where you can configure the various aspects of KDE.

**Figure 1.3. Setting Up a Profile**


If you choose, for example, *Theming* then *Setup Theming*, the configuration dialog for the themes opens. All changes you make here do not affect your current desktop, but are added to the profile you are working on after you confirm your changes with *Save* in the *Theming Setup* window.

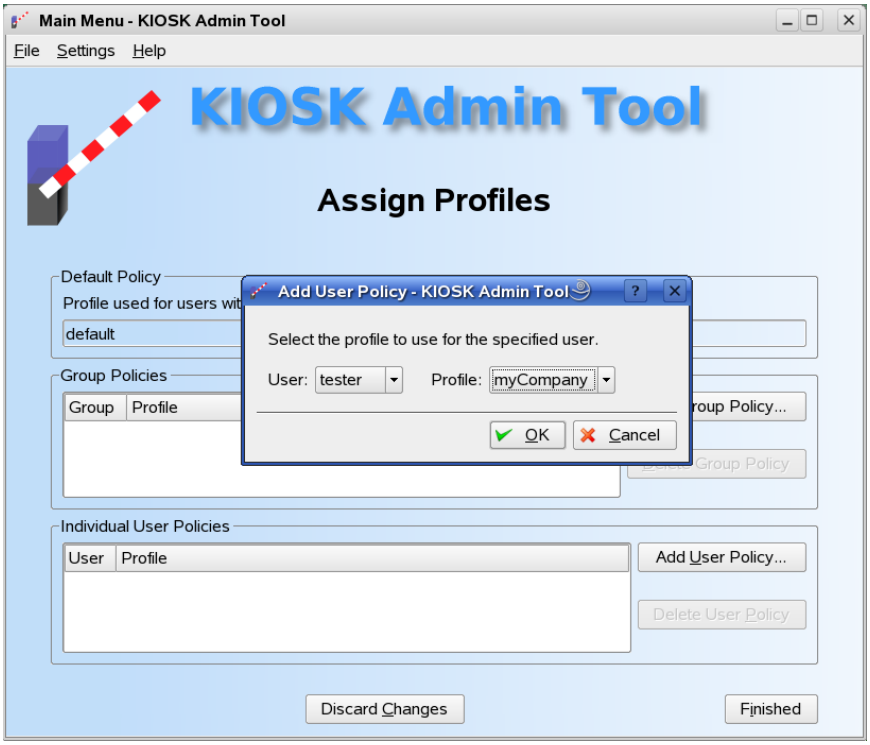
**Figure 1.4. Setting Up Themes**




After finishing setting up the profile, return to the main menu by clicking *Finished*.

5. Assign the profile to distinct users or groups by clicking *Assign Profiles*.

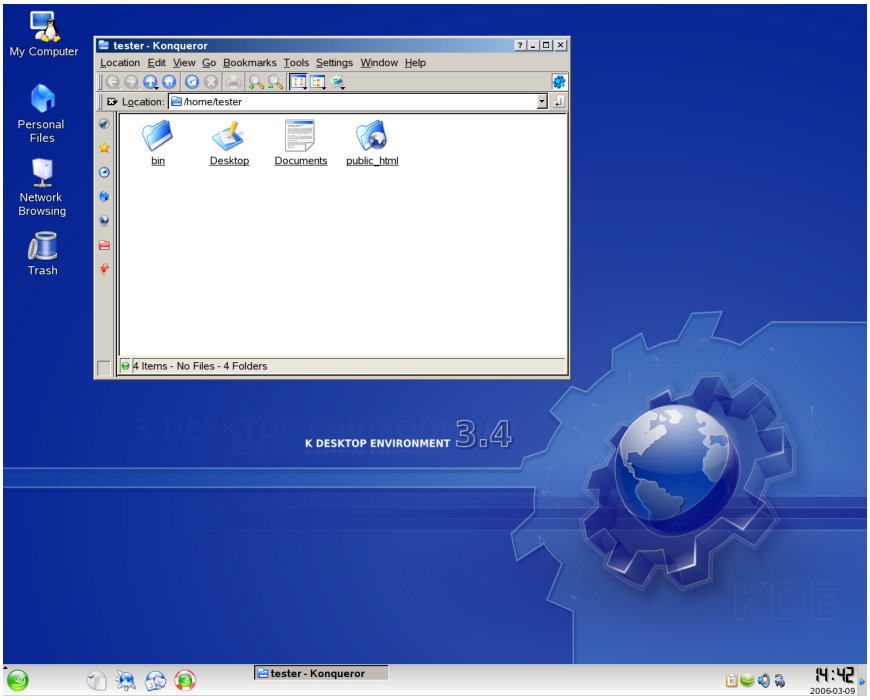
### Figure 1.5. Assigning Profiles




Return to the main menu by clicking *Finished*.

6. Now the profile is available on the local machine. Before deploying it to the remote host, you can test it. Start a new session by right-clicking the desktop and choosing *Switch User* > *Start New Session* then log in as user `tester`.

### Figure 1.6. The Profile in Use



Return to your own desktop by logging out as `tester`. If you need to make changes, start the setup procedure again. Otherwise leave the KIOSK Admin Tool. On exit, it deploys all profiles to `testserver`. You must enter the `root` password on `testserver` for this operation. Because the profiles are deployed to the default KDE profile location in this example, no further action is required. The next time `tester` logs in on `testserver`, the myCompany profile is used.

# Managing Profiles Manually

If you prefer manually editing configuration files over using a graphical tool, the KIOSK framework lets you do this, too. Every configuration file in a profile is a plain text file that can be edited with the editor of your choice. KIOSK's configuration and deployment options are described in detail in The KDE Source Repository at http://websvn.kde.org/trunk/KDE/kdelibs/kdecore/README.kiosk?view=markup. Refer to this resource for details. In the following, only the fundamentals needed to use the KIOSK framework are described.

## File System Hierarchy

KDE reads and stores files used by the KDE environment itself as well as by the KDE applications in fixed directory trees, also referred to as “profiles” in this context. By default, there are two such directories: and . The directory contains the user-specific settings. The directory contains data and configuration files that came with the packages. It is not recommended to make any changes there, because they get overwritten with the next update. Therefore, as a system administrator you can create additional trees that are used by the KIOSK framework. The default location for an additional fixed directory tree is . You can add custom locations in . Refer to the KIOSK documentation for details.

A fixed directory tree consists of the following directories (although not all directories need to be present):

Executables

Help center scripts

Libraries

Communication sockets

Temporary files

Cached data

Application and configuration data

Among others, the directory contains the following subdirectories:

.desktop files for all applications appearing in the KDE menu

The KDE menu structure

Configuration files for applications and components as well as the global configuration file

Icons, categorized by theme, dimension, and usage category

.desktop files with mime types

Images that can be used as background pictures

KDE scans all directory trees known to the system. When a specific file is present in multiple directory trees, the order of precedence determines which file is used.

When configuration files are scanned, an additional rule applies. Generally, the contents of multiple configuration files with the same name are merged. However, if the same configuration key is defined more than once, the key from the file with the highest precedence determines which value is used.

The rule of precedence is:

1. User directory ()

2. Directories configured in

3. Systemwide default directory ()

As a user, you can overwrite this order by setting the variable `$KDEDIRS`. Directories should be separated by a colon (`:`). The first directory has highest precedence and the last one lowest precedence.

## Configuration File Format

KDE configurations are stored in text files in UTF-8 format. Each configuration option consists of a key and value pair and is placed inside a group:

```
[Group 1]
  key=value
  key 2=value 2
```

White space at the beginning or end of keys and values are ignored. However, both may contain spaces as shown in the example above. If a value is supposed to start or end with space or should contain line breaks or special characters, use the following special codes:

- `\s`: space
- `\t`: tab
- `\r`: carriage return
- `\n`: new line
- `\\`: backslash

To use dynamically generated values, KDE allows you to use *shell expansions*. If a key is followed by `[$e]`, shell expansions are activated. When using this construct, the value is written to the file the first time it is read. Using `[$ie]`, lock down this behavior so the expansion is evaluated every time the configuration file is read. Shell expansions allow you to either use environment variables or the output of commands as values.

```
[example group]
  UserName=$USER
  Group=$(id -g)
  HomeDirectory=$HOME
```

All configuration values can be localized with a language code added to the key entry:

```
[example group]
  Label=Language
  Label[de]=Sprache
  Label[ru]=Язык
```

All configuration entries can be protected from being overwritten. You can lock down entire configuration files, groups, or individual keys. Do this by adding [Si] on a separate line at the beginning of a file, placing it behind the group name, or adding it behind a key.

```
[example group][$i]
```

```
  Label=Language

[example group 2]
  UserName[$i]=$USER
```

### Activating Profiles

Profiles can be created anywhere in the file system. To make the KDE environment read your profiles, you must make them known to the system in . The default profile location  is already configured there.

By default, a custom profile is not associated to users or groups. You can make this association in the user profile map file at . The only exception from this is the default profile. If you create a profile named “default” under  this is automatically associated to all users on this machine (such a profile does not exist by default).

Find more detailed information about activating profiles and mapping them to users in the KIOSK framework documentation.

### Examples

openSUSE comes with three predefined profiles (redmond, simplified, and Thinclient) located in . You may use one of these as a template for your own profile.

## For More Information

http://www.kde.org/areas/sysadmin/

# Chapter 2. GNOME

There should me more topics. Do you have an idea? If you want to contribute, please go to http://developer.novell.com/wiki/index.php/Lessons_for_Lizards.

# Chapter 3. Installation

There should me more topics. Do you have an idea? If you want to contribute, please go to http://developer.novell.com/wiki/index.php/Lessons_for_Lizards.

# 3.1. Installation on System with less than 256 MB RAM

Klara Cihlarova
Martin Vidner
$Revision: 01 $
$Date: 2007-01-08 $

### Note

This how-to is for openSUSE 10.2 and later. Some features cannot work for older versions

## Saving Memory Tips

If you have a little memory on your system, you probably want to save any Byte you can. Here are some tips:

- Install from CD or DVD. If you use HTTP or FTP for the installation, the filesystem must be copied to RAM (about 70 MB large) before it is used.
- Prepare swap partition before for installation. If you already have a swap partition on your system, you can activate it before the installation start with the parameter `addswap=hdaN`, where N is the number of the swap partition in your Linux system. If you don't make it, YaST ask you about swap activation later.
- Install in the text mode. Using the text mode for the installation (ncurses) saves about 10 MB compared to the graphical mode (qt).

  To start installation in the text mode, pres F3 key and select `Text Mode` or enter boot parameter `textmode=1`
- Reduce the logging. To do it, set the parameters Y2MAXLOGSIZE (in KB) and Y2MAXLOGNUM.

  ```
  Y2MAXLOGSIZE=1000
  Y2MAXLOGNUM=1
  ```

  If you find a problem during installation, skip this step.

## Creating swap Partition during Installation

1. Start installation.
2. Swith to the text console. To do it, press Alt + F2
3. To create a partition for you swap, use fdisk command. For example `fdisk /dev/hdX`, where X is a letter of the disk on your. It starts a application promt. If you need a list of commands, enter `m`. For more information, press `x` and then `m`. To quit without saving, press `q`. To save and quit, press `w`.

   To create a new partition, enter `n` option and choose a partition type, primary or extended, then the start cylinder. To create 512 MB large partitionhe, enter to the end cylinder prompt `+512M`. The type of the partition must be 82 - Linux SWAP partition.

4. Verify the new partition configuration with `p`.
5. Save and close the fdisk. To do it, use `w`.
6. Format the new partition as swap. To do it, use `mkswap /dev/hdXN`, where X is the disk letter and N is the number of the partition in your system.
7. Add swap to the /etc/fstab.
8. Activate swap. To do it, use `swapon -a`.

# Chapter 4. System Administration

## 4.1. Using Several Keyboard Layouts

$Revision: 110 $
$Date: 2006-12-22 00:34:25 +0100 (Fr, 22 Dez 2006) $

### Problem

You need to have several keyboard layouts available on your computer.

### Solution

In openSUSE you may use the default configuration program sax2 to accomplish this task.

1. Start the YaST Control Center, and select *Hardware* > *Graphics Card and Monitor*.
2. In the upcoming user interface, select *Keyboard*.
3. All available keyboard layouts are presented in the box *Additional Layouts*. Find the needed layout in this table and activate the "Status" check box for this entry.
4. Select the *Options* tab to define the way how your keyboard will be switched. There are many different possibilities to do that. For example, if you want to change the keyboard layout by pressing both shift keys, select the check box in front of *Both Shift keys together change group*.
5. Click on *OK* to finish the configuration.
6. To finally activate the settings, you have to restart Xorg. Either finish your session and restart Xorg, or simply do a reboot.

### Discussion

The console of a computer is responsible for managing the available input and output resources. Although it is also possible to have applications translating the keyboard characters, or even desktop systems, that have this functionality, one can avoid many problems, when the console, in this case this is the application Xorg handles all the events. The correct keyboard is simply available for all running applications.

On the other hand, there might be a problem to this. The different keyboards are already available at login time. This means, that if you have the keyboard in a different mode than you expect, user name and password are likely to be wrong. Special care has to be taken to avoid this problem, for example by pressing some known key in the user name field.

### For More Information

Find more information about configuring XKB at http://ftp.x.org/pub/X11R6.9.0/doc/html/XKB-Config2.html#2.

## 4.2. Using SSH without Entering Your Password

Needs proofreading
$Revision: 148 $
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You have two connected computers and want to log in to one computer from the other without entering your password every time.

# Requirements

Check the following entries:

1. Two computers, equipped with working network cards and properly connected.
2. The package `openssh` is installed on both computers.
3. The SSH port on both computers is open. You have to check your firewall settings.
4. The SSH daemon runs on each computer.

# Procedure

We assume that there are two computers with the following parameters:

| | **Name** | **IP Address** |
|---|---|---|
| Computer A | earth | `192.178.1.1` |
| Computer B | moon | `192.178.1.2` |

Do the following:

1. Create your public and private key pair on `earth` first:
   a. Create the key pair with
      ```
      ssh-keygen -t rsa
      ```
   b. Enter the file in which to save the key. In general, you can use the default value and just hit Enter.
   c. Do not enter a passphrase.
2. If you have the same login name on both computers, copy your public key to `moon` with:
   ```
   ssh-copy-id -i ~/.ssh/id_rsa.pub moon
   ```
   If you need to work on `moon` with a different user, use this:
   ```
   ssh-copy-id -i ~/.ssh/id_rsa.pub user_on_moon@moon
   ```
   If you do not have `ssh-copy-id`, use the following procedure:
   a. Export your public key to `moon`:
      ```
      cat ~/.ssh/id_rsa.pub | ssh moon 'cat >> .ssh/authorized_keys'
      ```
   b. Enter the password on `moon`.
   c. Log in to `moon` and set the correct permissions:
      ```
      chmod 644 ~/.ssh/authorized_keys
      ```
3. Log in to `moon` with `ssh moon`. If need a different user, use `ssh user_on_moon@moon`.

After these steps, you can log in from `earth` to `moon` without entering a password. If you also want to log in the other way around, just exchange the two names and repeat the above steps.

## Troubleshooting

If something does not work, check the following:

1. Are the two computers connected properly?

2. Can you ping `earth` from `moon` and vice versa? Use `ping earth` or `ping 192.178.1.1`.

## For More Information

http://www.openssh.org/
: This is the main Web page for SSH.

`man ssh`
: Find more information about the command `ssh` in this man page.

# 4.3. Creating a Bootable USB Stick

Thomas Schraitle
Needs proofreading
$Revision: 156 $
$Date: 2007-01-22 21:06:14 +0100 (Mo, 22 Jan 2007) $

You want to create an USB stick from which you can boot. This can be used as a rescue system or to store additional data that you can carry with you.

### Wrong Device Name Can Destroy Your System

Using the wrong device name leads to failure booting your system or data loss. Always check twice before entering and executing these commands.

### Preliminary Version: Use It at Your Own Risk

The description in this recipe is a *draft*. It is not finished. It has not been checked or edited in any way. If you want to contribute to it, please go to http://developer.novell.com/wiki/index.php/Lessons_for_Lizards.

## Requirements

You need the following:

- A USB stick. Most should work, but some users reported that it does not work for every USB stick.
- The device name of your USB stick.
- A BIOS that supports booting from a USB device.
- `root` permissions for this procedure.

## Procedure

The following list gives an overview of all steps for creating a bootable USB stick:

1. Determine the name of your USB device (see the section called “Getting Your USB Device Name”).

2. Install a master boot record (MBR) on your USB stick as described in the section called “Overwriting the Master Boot Record on Your USB Stick”.

3. Create a bootable partition on the device. This is explained in the section called “Making the USB Stick Bootable”.

4. Install a boot loader on the USB stick so it is able to boot. Refer to the section called “Creating a Bootable USB Stick with syslinux”.

5. Copy all the data required to boot a Linux system to the USB stick as described in the section called “Copying Necessary Data”.

6. Optionally create a home partition on the USB stick for storing personal data. Find directions in the section called “Creating an Optional Home Partition”.

## Getting Your USB Device Name

Before you start, you must know the device name of your USB stick. A wrong name can destroy your system and your data. Do the following:

1. Open a shell and become `root`.

2. Run:

   ```
   tail -f /var/log/message
   ```

3. Plug in your USB stick. You will notice some messages showing in your shell.

4. Look for the following entry:

   ```
   Dec 16 11:46:00 erde kernel: usb-storage: device scan complete
   Dec 16 11:46:00 erde kernel: SCSI device sda: 3987968 512-byte hdwr sectors (2042 MB
   ```

   The important information is emphasized: In this case, the USB device name is `/dev/sda` but it may differ your system, depending which devices do you have.

After these steps, you know the correct USB device name. Use it in the following steps.

## Overwriting the Master Boot Record on Your USB Stick

Before your USB stick is bootable, you must install a *master boot record* (MBR). Do the following:

1. Check your SUSE Linux version:

   - For versions greater than or equal to 10.2 proceed with Step 2.
   - For versions older than 10.2, you need syslinux version >= 3.31:

     a. Download http://download.opensuse.org/distribution/10.2/repo/src-oss/suse/src/syslinux-3.31-16.src.rpm.

     b. Open a shell and become `root`.

     c. Install the source RPM package:

        ```
        rpm -ihv syslinux-3.31-16.src.rpm
        ```

     d. Unpack the source tar file:

```
cd /usr/src/packages/BUILD
tar xjvf /usr/src/packages/SOURCES/syslinux-3.31.tar.bz2
```

e. Copy the MBR:

```
cp -vi mbr.bin /usr/share/syslinux/
```

2. Write the MBR to your USB stick:

```
dd if=/usr/share/syslinux/mbr.bin of=/dev/sda bs=512 count=1
```

After these steps, you have a master boot record on your USB stick.

## Making the USB Stick Bootable

After you have overwritten the master boot record (MBR), you have to make your USB stick bootable. Do the following:

1. Open a shell and become `root`.
2. Stop the HAL daemon to keep it from mounting the USB stick automatically:

```
rchal stop
```

3. Create a new partition:
   a. Run `fdisk` with the correct USB device name:

```
fdisk /dev/sda
```

   b. Press N.
   c. Choose a primary partition by pressing P.
   d. Choose the partition number by entering 1.
   e. Determine the size of your partition. In general, you can use the complete size of your USB stick.

4. Modify the created partition:
   a. Press T to change the type of your partition.
   b. Choose the partition number by entering 1.
   c. Modify the type of the first partition by pressing E (W95 FAT 16 LBA.)
   d. Make the first partition *active*, by entering A followed by 1.

5. Check and write your changes:
   a. Print your changes by entering P. It looks like the following output:

```
Disk /dev/sda: 2041 MB, 2041839616 bytes
63 heads, 62 sectors/track, 1020 cylinders
Units = cylinders of 3906 * 512 = 1999872 bytes
```

```
   Device Boot      Start         End      Blocks   Id  System
/dev/sda1   *           1        1020     1992029    e  W95 FAT16 (LBA)
```

b. Check your changes from your last step. If everything is correct, write your modifications by entering W.

6. Format the first partition:

```
mkdosfs /dev/sda1
```

After these steps, your USB stick is marked as bootable.

## Creating a Bootable USB Stick with syslinux

With this step, make the USB stick really bootable with `syslinux`, which is a Linux boot loader. Do the following:

1. Open a shell and become `root`.
2. Check your USB stick with `fdisk -l /dev/sda`. Of particular importance is the active partition, marked with a `*`. See Step 5.a for sample output.
3. Install the boot loader:

```
syslinux /dev/sda1
```

4. Boot from your USB stick. If it works, you should see something like this:

```
SYSLINUX 3.xx YYYY-MM-DD EBIOS Copyright (C) 1994-YYYY H. Peter Anvin
Could not find kernal image: linux
boot :
```

The version *3.xx* and date *YYYY-MM-DD* depends on the syslinux used.

5. Start the HAL daemon:

```
rchal start
```

Congratulations. Your USB stick is now fully bootable.

## Copying Necessary Data

FIXME

After this step, the USB stick contains the data needed to boot a Linux system.

## Creating an Optional Home Partition

This step is optional. Sometimes it is useful to have an additional partition to store personal data. To create a second partition, use the following procedure:

1. Open a shell and become `root`.
2. Downsize the first partition:

a. Run:

```
parted /dev/sda
```

You get the following output:

```
...
Using /dev/sda
(parted)
```

b. Type `resize` followed by partition number `1`.

c. Leave the start as it is: just hit Enter.

d. Decide how much space you need for your home partition. For example, if you have a 2 GByte stick, you could use 1 GByte for your boot system and the rest for your home partition. In this case, enter `1000MB` and press Enter.

e. Enter `quit` to leave `parted`.

3. Create a new second partition:

a. Run:

```
fdisk /dev/sda
```

b. Create a new partition by entering N.

c. Select a primary partition by entering P.

d. Select the partition number by entering 2.

e. Choose the appropriate size for your partition. In general, you can use the default values and just hit Enter.

f. Save your changes with W.

4. Format and configure the second partition:

a. Create a file system on the second partition:

```
mkfs.ext3 /dev/sda2
```

b. Disable the automatic file system check, if desired:

```
tune2fs -c 0 /dev/sda2
```

c. Mount the second partition:

```
mount /dev/sda2 /mnt
```

d. Create your home directory:

```
mkdir /mnt/home
```

After this step, you can access a home partition on your USB stick.

## Troubleshooting

Q: I got the error `Cluster sizes larger than 16 K not supported`

A: Try to use a more recent version of syslinux. Version 3.11 and higher is reported to work.

Q: The USB stick does not boot

A: Try to repeat the section called “Creating a Bootable USB Stick with syslinux”. If that does not work either, you should also try to format the stick under Windows.

## For More Information

http://syslinux.zytor.com/
Everything about syslinux, the boot loader.

http://www.gnu.org/software/grub/grub.en.html
GNU GRUB is another boot loader for Linux. This is not described in this recipe.

# 4.4. Configuring a Basic Home Network

Rebecca Walter
$Revision: 130 $
$Date: 2007-01-04 23:14:23 +0100 (Do, 04 Jan 2007) $

With the growing affordability of broadband Internet connections and computer hardware, it is becoming very common for a household to have an Internet connection with a reasonable speed and multiple computers wanting simultaneous access to the connection. This need can be met by creating a home network with one openSUSE system acting as the *server* or *gateway* that shares the Internet connection with other systems.

## Requirements

To configure this home network, you need appropriate hardware:

- An Internet connection that allows connection of a home network. Although only the server is visible to the outside world, consider any contractual restrictions placed by your Internet service provider (ISP).
- The hardware required to access your Internet connection. These directions assume this hardware is a DSL modem or other device to which you connect the computer with an ethernet connection.
- A system to act as server with two separate ethernet cards. Although other setups can work, this is an easy way to get a quick and relatively safe setup. This system should have a recent version of openSUSE installed with all available updates.
- Other systems using any operating system with the necessary network hardware, such as an ethernet card.
- The network infrastructure to connect all these systems. A simple and relatively inexpensive infrastructure uses ethernet devices in all systems. One or more switches or hubs are used to allow all systems to connect with straight ethernet cables. Alternatively, the server can connect to a wireless base station that then distributes the connection to wireless network cards in all other systems.

## Procedure

There are several simple steps to follow:

1. Configure the two network cards in the server, one for accessing the Internet and one for traffic coming from the internal network. Find detailed directions in the section called “Configuring the Server's Network Cards”.

2. Configure the server's firewall to block external attacks and allow the internal machines to communicate with the Internet. To learn how to set this up, refer to the section called “Configuring the Server's Firewall”.

3. Configure a forwarding DNS server to provide your internal network with name resolution. Find specifics in the section called “Configuring the DNS Server”.

4. Configure the other computers in the internal network with static private IP addresses. Additionally set them up to use your server for name resolution.

5. Connect all the home systems to the network and the server to the Internet.

6. Perform regular updates on your server to maintain the security of your internal network.

## Configuring the Server's Network Cards

One network card connects to the external network. In most cases, this card should obtain its IP address and name servers with DHCP. In rarer cases, these should be configured statically using the information provided by your ISP.

1. Start YaST as `root`. From the control center, select *Network Devices* > *Network Card*.

2. The overview should list two network devices. Select the one to use for accessing the Internet then click *Edit*.

   ### Tip

   If you do not know which network device is which, pick one then experiment with only the external cable after it is configured until you can access the network through it.

3. Select the option for DHCP unless your provider requires static information for connection. Otherwise enter the IP address assigned by your ISP.

4. Select *Hostname and Name Server*. Enter the desired name for your computer and make up a domain name for your local network. Disable modification of these settings with DHCP.

   Unless otherwise instructed by your ISP, do not enter any name server addresses or search domains. Select for these to be modified for DHCP. Click *OK*.

5. Click *Next* to finish configuring that card. Click *Next* again so the changes are saved.

This one network card is now configured to access your Internet connection. You may want to leave the cable disconnected until the firewall is configured for security reasons.

The second network card needs to be configured as part of the internal network. For the IP addresses of your internal network, select a range from one of the private address ranges, such as 10.10.10.x. Each system in the network must be assigned a different IP address from this range.

When you have selected the range, configure the internal network card:

1. From a `root` YaST control center, select *Network Devices* > *Network Card*.

2. Select the network card to use to connect with the internal network. Click *Edit*.

3. Configure a static IP address from your selected range. Make a note of the address, because it must be entered as the gateway on all other systems in the network.

4. Because only a small range of addresses are needed for the typical home network, enter `255.255.255.0` as the subnet mask. This means that the first three numbers of the IP address should be the same for all systems. Only the last number can vary.

5. Click *Next* to complete the configuration of this card. Click *Next* again to save the settings.

Both network cards for the server are now configured. Do not connect the external card until the firewall is configured to protect your network.

## Configuring the Server's Firewall

The firewall on your server has two vital purposes. It protects your entire internal network from attack. It additionally enables the other systems in the network to communicate properly with the outside world by disguising their IP addresses. Fortunately, an effective firewall can be configured easily with YaST.

1. In YaST as `root`, select *Security and Users* > *Firewall*.

2. For convenience, configure the firewall to start automatically in *Start-Up*.

3. In *Interfaces*, configure the network card set up to connect to the external network as part of the external zone. Configure the internal statically-addressed card as part of the internal zone.

4. For *Allowed Services*, remove any allowed services for the *External Zone*. Unless you want users on the Internet to be able to access data on your system or log in remotely, no services are needed. Allowing services can place your system at risk, so only do this if you know what you are doing.

   For *Internal Zone*, disable protection so all services are allowed. This means that anyone who gains access to your internal network has complete access to your server. This setting is normally best for a home network.

   The *Demilitarized Zone* is not used in this network setup, so those settings can be ignored.

5. To make the firewall pass data between systems in your internal network and the Internet properly, activate *Masquerade Networks* in *Masquerading*. No other settings need to be made there.

6. All other default settings work for this situation. Click *Next* to complete the configuration. Click *Accept* to save the settings.

## Configuring the DNS Server

The DNS server decreases the maintenance of the other systems in your network. Instead of having to maintain and possibly modify name servers on each system, the server can be used as a name server for all the clients in the network. This configuration is for a simple name server that transmits all requests to your provider's name servers. It does not provide name resolution for systems inside your network.

1. The first step is to find out what name servers your ISP authorizes you to use. This information may be in the information provided by your ISP in your account details or on its Web site. You can also get this information from a system connected to the Internet with DHCP.

   a. Connect the external network card to your DSL hardware and turn everything on. Give the network card time to make the DHCP connection.

   b. Open a shell and log in as `root`.

   c. Run `ifconfig` and look for your external network card. It should list an IP address. If not, run `rcnetwork restart` and repeat `ifconfig` to check again.

   d. Once your network has been assigned an IP address, it has also gotten the name servers. To view them, run `less /etc/resolv.conf`. In the output, look for lines starting with `nameserver`. Make a note of these IP addresses. They are the name servers offered by your ISP.

2. From the YaST control center as `root`, select *Network Services* > *DNS Server*.

3. In *Start-Up*, configure the DNS server to start on boot for convenience. The firewall ports should only be open on the network card that accesses the internal network.

4. *Forwarders* has the most important settings for this situation. Select *Set Forwarders Manually* then add the IP addresses of the DNS servers to use.

5. The other default settings should be acceptable for this situation. Click *Finish* to complete the configuration.

The DNS server starts automatically each time the system is booted. With an appropriate configuration, it enables clients in the network to contact Internet addresses by entering the name. It does not enable clients to connect to each other or the server by name.

# Troubleshooting

Problems can occur using the network. How to debug and resolve the problem depends on the nature of the problem.

A client in the home network is unable to access the Internet. This could be an inability to fetch e-mail or a problem opening a Web site. Try the following steps to resolve the problem or at least locate its cause:

1. First make sure that the server system is up and running. It cannot share Internet access with the clients when it is turned off.

2. If the problem still exists with the client, try pinging the desired address from the server. To do this, open a terminal or console on the server and enter a command like `ping www.example.com`. If this works, it means the server can resolve names. Also try to ping or access the exact address desired by the client (if it does not work but others do, the problem is with the desired site, not your network or system).

   If the server is unable to resolve hosts by name, there is a problem outside your server. Try restarting your Internet hardware and checking your cable connections. If that does not resolve the problem, you need to find the cause of your Internet connection problems for the server. Check any information from your ISP or other resources for resolving this problem.

3. If the problem does not exist on the server, the problem might be in the network connection. Try pinging the IP address of your server, for example, `ping 10.10.10.1`. If this works, the problem is not physical. If it does not work, check the cables, hub, and network card configuration on the client. Also check whether the server is able to ping the client's IP address and the configuration of the server's network card to the internal network.

4. If pinging by IP works, verify that the client is properly configured to use your server as its gateway and name server.

5. Once certain that the client is configured properly, verify that the DNS server is configured properly and running on the server. As `root`, run `rcnamed status`. If this does not output `running`, the DNS server is not running. Resolve this problem and try again. If it is running, compare the name servers in your DNS server configuration with those in  in case your ISP has changed name servers. Also try pinging the servers directly to make sure that they are up and running.

   Also verify the configuration of the firewall. A misconfigured firewall (without the masquerading function enabled) can prevent clients from receiving data from the Internet but still allow the server to communicate freely.

6. Try accessing the Internet from another client, if available. If it works on one client but not another, the problem is specific to that client. Recheck the setup of the client until you find the problem. In desperation, rebooting sometimes helps. If it does not work on any client, the problem is in the server, the network hardware, or something outside the server, such as your Internet hardware or the connection availability. You can try resetting the Internet hardware, waiting an hour and trying again, rebooting the server just in case, or contacting your ISP's service department to check if there are any known problems with the Internet at the current time.

7. If none of this works, bribe or hire a Linux geek to help you.

## For More Information

TODO: links to relevant parts of reference for more detailed config directions. links to how to improve the server: dhcp server, print server, dns zone for internal name res, etc.

# 4.5. Using Swap Files

Alexey Eremenko "Technologov" <al4321@gmail.com>
$Revision: 09 $
$Date: 2007-01-01 $

## Scenarios

- You want to frequently change the swap size.
- You want to save entries in the partition table.
- You want to add swap without repartitioning.

For all above, Swap partitions (default under openSUSE) cannot be used.

## Procedure

This How-To uses standard GNU/Linux commands, therefore it is not specific to openSUSE.

In every Linux OS you can manually configure swap files:

1. Before we begin, you must enter the `root` mode by using the command `su`. Create a new file with the size you like, for example, 256 MiB.

   ```
   # dd if=/dev/zero of=swapfile.img bs=$[1024*1024*256] count=1
   ```

   NOTE: strictly speaking, the ".img" extension is not required, but I use it to destinguish between abstract term and the actual file. (and for easier searching)

2. Initialize and Format the file:

   ```
   # mkswap swapfile.img
   ```

3. Start using swapfile:

   ```
   # swapon swapfile.img
   ```

4. Stop using swapfile:

   ```
   # swapoff swapfile.img
   ```

5. Finally, if you want to make loading of swapfile permanent (during system boot), you must add your swapfile to "/etc/fstab", which is a filesystem configuration file used during boot.

   This can be done by the command below:

   ```
   # echo $(pwd)/swapfile.img "swap" "swap" "defaults" "0 0" >> /etc/fstab
   ```

## Diagnostics

There are several commands to diagnose that swap is setup correctly:

shows all swap files and partitions:

```
# cat /proc/swaps
/home/suser/swapfile.img                file            262136  0       -2
```

shows all VirtualRAM, including RAM and swaps:

```
# free
```

## Understanding

Understanding the command `dd` from step1: (not required for successful setup)

Let's explain the command above: dd = disk dump - often used to copy blocks of data. dd is part of "CoreUtils" and comes standard with every Linux system.

As input we use binary "zero"s and as output we use "swapfile.img". "bs" means block size - how big each block of data we want to move. we compute it based on: 1024*1024 (=1 MegaBinaryByte, MiB) and *256 that's what we want to achieve; then we use "count" = 1, that is the multiplier. If we don't specify "count", "dd" will make system calls recursevily until your Hard Disk is full. Using big blocksizes with count=1 is the fastest way.

Understanding the command `echo` from step5: (not required for successful setup)

You must use "root" mode to access fstab.

echo is often used for simple use such as output text on display. echo is part of "CoreUtils" and comes standard with every Linux system.

Here we use a more complex syntax. To take something from point "A" and move it into file.

So first we get (output) the current directory, then use the filename "swapfile.img", then we have first "swap" occurence for mount point and second occurence for filesystem type. The "0 0" are additional parameters, which we don't use. now the ">>" is redirection to add all of that to existing file "/etc/fstab".

## For More Information

For more information about the term "MegaBinaryByte", "Mebibyte" or simply "MiB" look: http://en.wikipedia.org/wiki/Binary_prefix.

For more information about the dd command, use:`man dd`

# 4.6. How-To Create 10 GB File Instantly (with dd)

Alexey Eremenko "Technologov" <al4321@gmail.com>
$Revision: 11 $
$Date: 2007-01-01 $

"to dd or not to dd" - that is the question...

## Scenarios

You want to create a file to use as a virtual hard disk for a virtual machine.

-or-

You want to create a file to use as a virtual hard disk for loopmounting.

# Procedure

This How-To uses standard GNU/Linux commands, therefore it is not specific to openSUSE.

To find out how much is free you can use from command prompt:

```
linux:/ > df
```

The output will look like this:

```
Filesystem           1K-blocks      Used Available Use% Mounted on
/dev/hda2             40321836  28054876  12266960  70% /
tmpfs                   257892         0    257892   0% /dev/shm
```

This means that you have some 12 GB of unused space, so you can proceed with next command that will create 10 GB file:

```
linux:/ > dd if=/dev/zero of=myimage.img bs=1000 count=0 seek=$[1000*1000*10]
```

# Caveats

This trick will work on ext3 and reiserfs, but will NOT work on FAT32 partitions as they have maximum file size limit of 4 GiB.

Additionally, because this file is null from within, some programs will fail working with it, for example: `mkswap` and `swapon`. For absolute majority of utilities it will work.

# Understanding

Let's explain: `dd` is often used to copy blocks of data and is part of "CoreUtils" that comes preinstalled with every Linux system.

As input, we use binary "zero"s and as output we use "myimage.img".

"bs" means block size - how big each block of data we want to move.

"seek" means over how much blocks we will jump. The more we'll jump, the less we'll work :)

"count" means how many blocks needs to be written.

Because our file is nil (vacuum) from within, we write zero blocks. If we don't specify "count", "dd" will make system calls recursively until your hard disk is full.

Using big blocksizes with count=1 is the fastest way to fill file with zero's.

Using big blocksizes with count=0 is the fastest way to create "nil" file.

Nil, or Vacuum files is a concept that does not exist under FAT. So for newbie users, I will try to explain:

Basically this concept says: you don't have to waste hard disk space for "nil" files, unless you write something to them. Their size is only visible under certain condiftions. It's like a growable file, if you can imagine this. So they have 2 advantages: they don't use space unless used, and they are very fast.

## Rumors

Some rumors say, that contrary to popular belief "dd" does not stand for "disk dump" but for "convert and copy" instead. The abbreviation "cc" was already taken by the C compiler, so they decided to use "dd". -- by Dennis Conrad, Novell Consulting ANZ

## For More Information

For more information about the original how-to, look: http://en.opensuse.org/How-To_Create_10_GB_file_instantly_with_%22dd%22.

# 4.7. How-To View Kernel Configuration

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$Revision: 07 $
$Date: 2007-01-01 $

## Scenario

You got a binary kernel from some Linux system. You want to know it's configuration options and which extra modules were added to it.

For example: openSUSE does not use the standard Linus Torvald's „vanilla“ kernel, but uses a modified version of it, therefore I want to know which extra features were added. Unfortunately, finding such a documentation across distros is very difficult, so I had to learn a way to do exactly that.

The technique I describe here allowed me to see that SUSE Linux 10.0, while on paper had a kernel-version below the requirements for running FUSE, actually *had* FUSE included.

## Procedure

This How-To uses standard GNU/Linux commands, therefore it is not specific to openSUSE.

1. The command is very simple: (Note: it can be run as an unpriviledged user!)

   ```
   suser@localhost:~> cat /boot/config-"your kernel version"
   ```

2. Example1: Of course we can add some search filters to it, for example to search for FUSE, use:

   ```
   suser@localhost:~> cat /boot/config-"your kernel version" | grep -i fuse
   ```

   Example2: list all the `iptables` firewall modules that are included in your specific kernel.

   ```
   suser@localhost:~> cat /boot/config-"your kernel version" | grep -i netfilter; cat /
   ```

# 4.8. How-To Connect Graphically from Remote: `FreeNX`

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$Revision: 13 $
$Date: 2007-01-05 $

# About

NX (new X) is a new wonderful remote access protocol. It is both fast, secure, graphical and open. (as opposed to telnet protocol, which is only fast and open.)

NX is basically a client/server protocol, that allows you to graphically access any machine, is based on both SSH (for security) and X compression (X for graphics and compression for saved bandwidth, which results in better speed), and NX software is much easier to use than normal X protocol for remote connections.

This article describes how-to configure openSUSE as a terminal server, some background of NX, and how to connect to it.

Think of NX as a competitor to Microsoft's Remote Desktop and Terminal Services.

# Procedure

1. First enter `root` mode, by using the command `su`. then we must check if our software is installed: "FreeNX" Server and proprietary NoMachine's NX Client:

   ```
   # rpm -q FreeNX nxclient
   FreeNX-0.5.0-25
   nxclient-2.1.0-11
   ```

   The output above shows packages versions, which means both are installed. If not, then install them first.

   Fortunately, the FreeNX server is included in openSUSE CDs and DVD. The NX client must be downloaded manually from: http://www.nomachine.com/download

2. After the packages installed, use this command to configure FreeNX server:

   ```
   # nxsetup --install --setup-nomachine-key --clean
   ```

3. Start NoMachine's NX client and type: "localhost" as my host, "22" as my SSH port - after all NX is based on SSH, use your user's name and password, desktop: UNIX/KDE (my preference!), set the resolution to something smaller than your real screen for test, press ok.

4. If your firewall is on (default openSUSE setup), you must configure your firewall to accept TCP Port 22 - to allow SSH and NX traffic to pass from remote computers. To do so:

   Yast Control Center->Security and Users->Firewall->Allowed Services->SSH->Add->Next->Accept

5. From now on, I will explain more advanced uses of NX. Those are "extras"; not needed for successful basic configuration.

# History of NX

The NX Protocol (new-X) was created by NoMachine few years ago as a proprietary extension to X, for fast and secure remote access. NoMachine released their core libraries to the public, licensed under the GPL. Kurt Pfeifle - a KDE developer - took those libraries and created a product called FreeNX server!

NoMachine now sells their enterprise server software and gives away their NX client as freeware. Later, they also decided to release their commercial single-user "Personal" NX server as freeware.

We, the Open-Source community, can use GPL'ed implementation of this wonderful NX protocol, and we have built open-source FreeNX server and the KDE "knx" client.

Unfortunately, the knx client was never updated, so it can not work with newer releases of the NX server, such as the version of FreeNX included with openSUSE. Basically "knx" is dead. This means, that until someone updates the client, we are forced to use the proprietary one, and be limited to the number of platforms NoMachine chose to support, without any desktop integration.

# Backwards Compatibility

There are 2 generations of NX, that I know of. They are not fully compatible. It is highly recommended to have both the client and the server to be fully compatible at the protocol version.

Nomachine's NX version 2.0 is = FreeNX 0.5 (openSUSE works here)

Nomachine's NX version 1.5 is = FreeNX 0.4 (dead "knx" client works here)

# Additional Information about NX Clients

In the real world, running a terminal server requires more than just configuring NX server. It requires to configure users on the server. On openSUSE it's easiest to do with Yast. Now we need to configure the clients. There are several ways for achieving this:

Using existing (Windows ?) Workstations and simply install NX Clients on them.

Use LiveCDs that comes with NX Client v2.x.

Unfortunately, the openSUSE Live DVD does not meet the specs - it doesn't include NX Client and doesn't include UnionFS to install the NX Client. Of course, you can manually install the NX client with user account to RAM disk, as RPM supports such non-standard ways, but it's harder than Knoppix. Alternatively, you could use "klik" packaging system to install nxclient anywhere.

The NoMachine's NX Client can run on:

1. Windows 95...XP (x86 and x64)
2. Linux - starting from RedHat 8, SUSE 8, Debian 3, ... (x86 and x64)
3. Mac OS X 10.0 (x86 and PPC)
4. Sun Solaris UNIX 8 (SPARC)

NOTE: The NX Server cannot run on Windows or Mac, because those OSes are not based on X Window System. Microsoft Windows uses GDI, while Mac OS X uses Aqua. Therefore NX Server can run only on UNIX-like systems; including BSD, Solaris and Linux.

# Changing NX TCP Port

Because changing NX port on the client is straightforward, I will concentrate on the server here.

Since FreeNX server is based on SSH, actually integrates into it, and has no separate daemon, changing NX port will require you to change SSH port as well, or NX will fail. The default TCP port of SSH and NX is 22. The configuration files on openSUSE are:

1. In file below find: "SSHD_PORT"

   ```
   localhost:/ # cat -n /etc/nxserver/node.conf | grep SSHD_PORT
   ```

   NOTE: This command will only return the # of line, which needs to be edited manually.

2. In file below find: "Port"

```
localhost:/ # cat -n /etc/ssh/sshd_config | grep Port
```

3. ...and do not forget to restart the SSH service afterwards with:

```
localhost:/ # rcsshd restart
```

Tip for advanced users:

By using this technique, you can effectively setup a farm of Linux distros even on your home PC. By using some kind of virtualization (VMware/Qemu/Xen), you can set up virtual NX servers to listen on different TCP ports. This is really cool, because it can be used from both a LAN and from the Internet at the same time.

## Runlevels

The NX Server can run in runlevel 3 or 5. NX Server does not use the video card, so it will work.

NX Client, however, will require you to use runlevel 5. (That's applicable only if you run NX client on Linux, since Windows has no concept of runlevels. )

To find out, in which runlevel you are working now, use:

```
> who -r
 run-level 5  2006-04-24 17:33                   last=S
```

## For More Information

Overall: FreeNX as a terminal server is great, because it's very fast, secure, and the software is not the limited by the number of clients. Your only limitation is the power of your server. (that is: the performance of your CPU and amount of RAM)

Unfortunately, knx client doesn't has any home page.

Look at the original article here: http://en.opensuse.org/FreeNX_Server_HOWTO.

NoMachine's Home Page: (creators of NX) http://www.nomachine.com.

Wikipedia page dedicated to FreeNX: http://en.wikipedia.org/wiki/FreeNX.

FreeNX Home Page: http://freenx.berlios.de/.

Original article written on: 21.apr.2006.

# 4.9. How-To Start Text-mode Shared-sessions (with `screen`)

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$Revision: 07 $
$Date: 2007-01-06 $

## Scenario

As you know, GNU/Linux is a multi-user OS. For example: two users are working on the same machine, and want to have same session to work together. By default, each one will get a different tty (terminal) and it's over. The sessions are separated.

The technique I am going to describe is useful in real-world, when I and my friend came together to learn Linux CLI via the Internet - we started Skype session (for VoIP) and shared session.

Shared sessions are very useful if you want to see what the other person is doing, typing, etc...

The software I am going to describe here is `screen`: a powerful screen manager and terminal emulator.

Actually `screen` is almost a window manager but in text-mode, if you can imagine that.

## Procedure

This How-To uses standard GNU/Linux commands, therefore it is not specific to openSUSE.

1. First, make sure that `screen` package is installed, by issuing `rpm -q screen`.

   If not, then install via Yast. Fortunetaly, it is included with openSUSE.

2. Both users must be logged in via the same account. Either remotely (telnet or ssh), or from local terminal, doesn't matters. Create a separate account, if must with Yast.

   The first user must type `screen` to create a session

3. The second user must type `screen -x` to join a session

4. Excellent ! Now you have your shared session, and now, what the first guy types, the second guy sees instantly on his "screen" :)

   To exit screen use: “ctrl+a”, then “ctrl+\”, “y”

## For More Information

Screen has a lot of features to manage text-based windows, and full documentation is included with openSUSE, just type: `info screen`

# 4.10. Looking Glass 3D

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$Revision: 09 $
$Date: 2007-01-07 $

## Introducing

Project Looking Glass 3D, or LG3D for short, is a revolutionary method of user interaction with their computers - a 3D Desktop actually.

This method allows users to utilize 3D capabilities of their computers, resulting in having a stunning 3D environment and more user-friendly touch.

LG3D developed by Sun Microsystems and The Open-Source community, using Java, for several years now, and recently hit the v1.0 mark. It allows people to use new LG3D applications as well as their existing X-applications on the new 3D desktop, while replacing the traditional “Window Manager” by the new 3D “Scene Manager”.

It gives people more eye-candy and potentially will make computer usage easier. It can run on top of your current environment (KDE/GNOME) or replace them.

This article is going to describe how-to setup and work with LG3D. Note that currently it is still too early to be considered as a production setting, so don't expect it to replace KDE kwin or what-you-have any years soon. Fortunately the v1.0 is stable enough, so I did not experience any crashes during the several days I worked with it.

# Requirements

1. CPU: Intel Pentium III or AMD Athlon 1 GHz class or faster.
2. RAM: 512 MiB
3. 3D Graphics Accelerator: GeForce 3 class and up (or any video chip supporting OpenGL v1.3) with 32MiB of video RAM or more. Make sure that Accelerated drivers installed. To show OpenGL version, use:

   ```
   glxinfo | grep –i "GLX version"
   ```

   To show the amount of video RAM you have, use:

   ```
   grep –i ram /var/log/Xorg.0.log; grep –i mem /var/log/Xorg.0.log
   ```

   NOTE: It's not very reliable, so look here: http://en.opensuse.org/How-to_view_the_amount_of_Video_RAM_on_Linux%3F
4. Screen resolution: 800x600 or above at 24 or 32-bits (True Color)
5. Disable XGL, because it is not compatible with LG3D.
6. Fast Internet to download stuff. half Mbps or up.
7. 3-Button Mouse (LG3D makes use of middle mouse click)
8. openSUSE x86 (does not run on x86-64 or other architectures)

NOTE: The requirements listed here are recommended, not absolute minimum. LG3D might run with lower specs.

# Installation Procedure

1. Download LG3D from their site: https://lg3d.dev.java.net/lg3d-getting-started.html as it is not included with openSUSE.
2. Choose “binary mega-bundle” for Linux, x86. It includes Java6, Java3D and LG3D and weigths at about 150 MB.
3. Once download complete, you can install it either as normal user, or as `root`. setup read and execution rights, and run the file:

   ```
   suser@localhost:~> chmod a+rx ./lg3d--1-0-0-linux-i686-0612190943.bin
   suser@localhost:~> ./lg3d--1-0-0-linux-i686-0612190943.bin"
   ```

4. Now you are ready to run it ! Once again, check your execution rights, and just run:

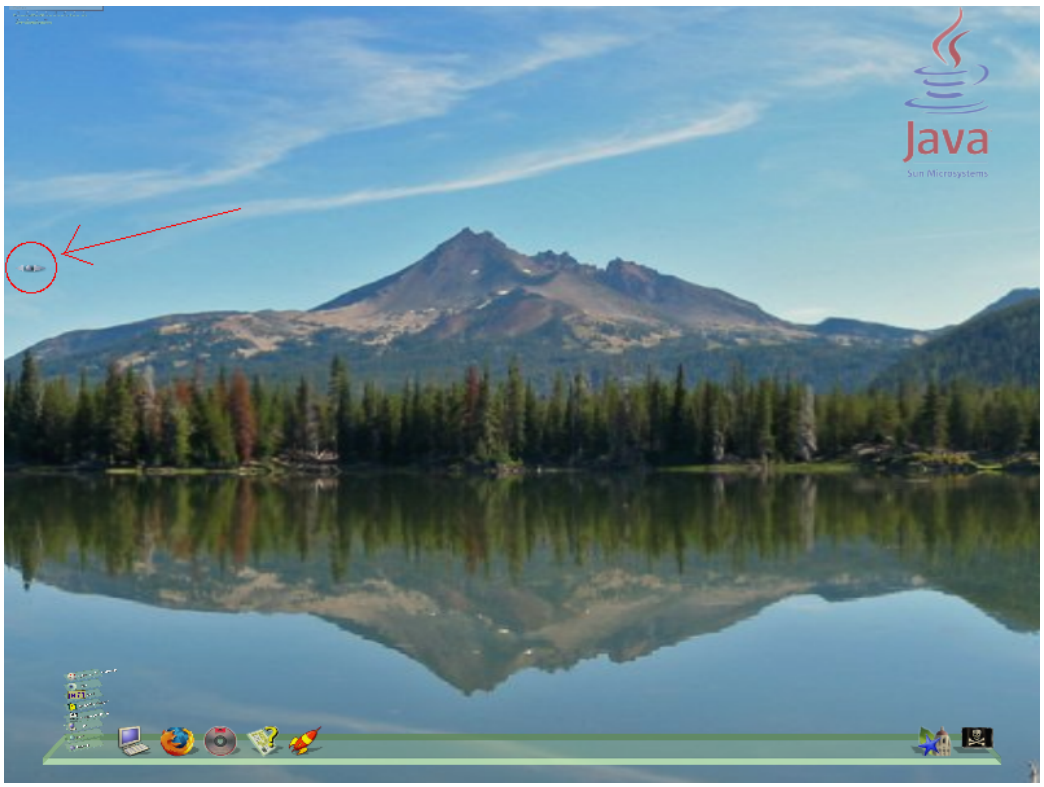
   ```
   suser@localhost:~> chmod a+rx ./lg3d/bin/*
   suser@localhost:~> ./lg3d/bin/lg3d-app
   ```

# Navigation

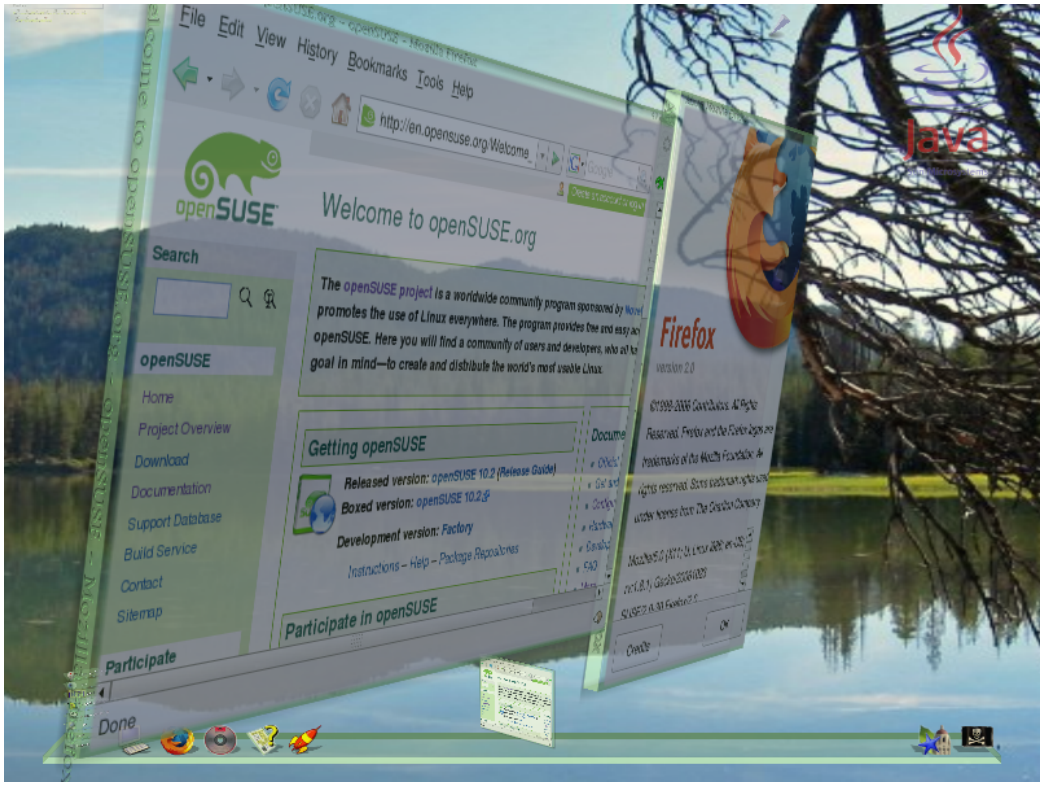
A 3D desktop requires new concepts and new ways in navigation in a new 3D space. Here I will describe some of the capabilities of the new LG3D Scene Manager. Unfortunately it is preconfigured to react upon mouse move, and, unlike KDE kwin, cannot be configured or customized otherwise.

1. File Manager - There is an integrated file manager in LG3D. To use it, just move your mouse to top-left corner of the screen. It is not convenient, because it interferes with my work, but LG3D is not configurable. period.

2. Multiple Desktops - LG3D provides us with an equevalent of KDE Pager, with up to 3 useble Desktops or "workspaces", left, middle, and right. You start LG3D in middle desktop. To move to left desktop, move your mouse to the left side of the screen, near it's end, until the cursor changes shape. Then, left-click to move to left desktop. Screenshot:




3. 3D view/rotate - move your mouse to the Java Logo at top-right corner of your screen, left-click, don't release, and move your mouse around to rotate your 3D workspace. Once you release your left-mouse-button, the windows will go to original state. There is no way to save position. Screenshot:



4. Taking notes - it is possible to write some notes on the back of any X-application by right-clicking on the application window-name at the top of the application window. Very useful feature.

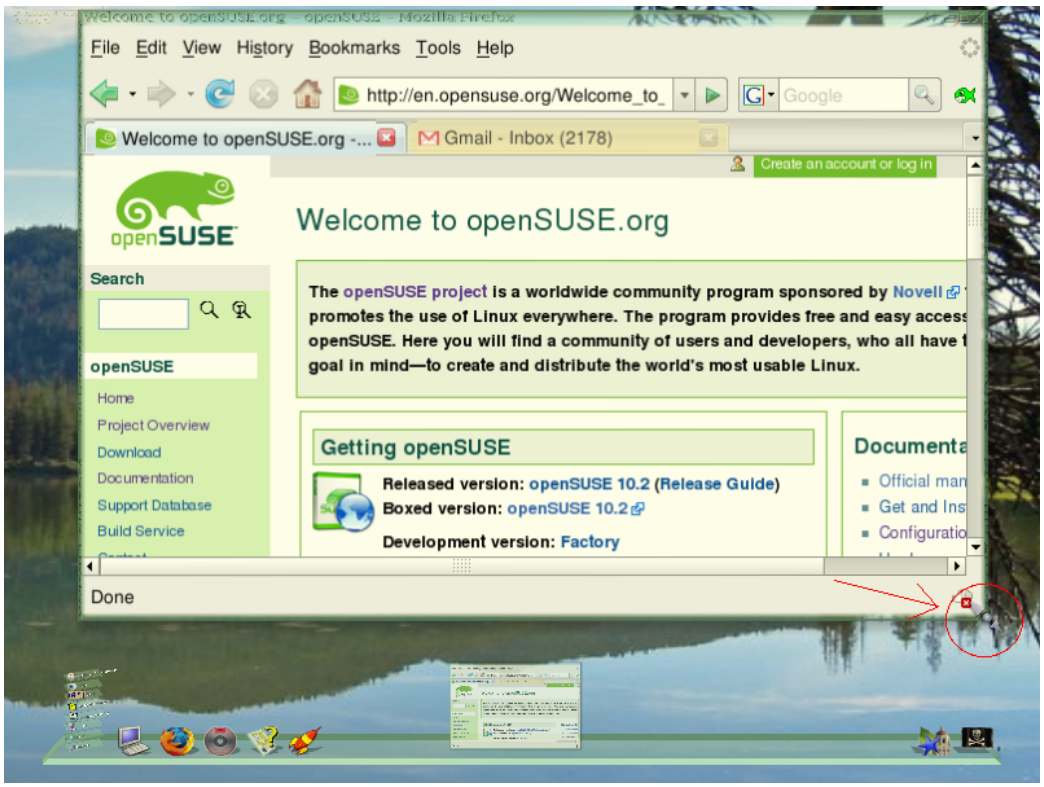
5. 3D minimize - with Middle Mouse Click on window name (top of the window) - it allows a new sort of "minimized" windows, that is - unfocused windows flowing in 3D space - a very useful feature. Alternatively, you can left-click near minimize button, on top of the window, to 3D minimize either to left or to right side. Unfortunately, that works only on middle desktop. Screenshot:


NOTE: On the screenshot above, you see both normal minimize - a window at the taskbar *and* a 3D minimize -- window floating in background 3D space.

6. Close Window - either use "X" at top-right corener as in normal WM, or right click at on the window on the taskbar. Do not use Alt+F4, as it will close LG3D.

7. Switch to Full Screen is easy in KDE (Alt+F3->Advanced->Full Screen), or left-click on top-left window corner->Advanced->Full Screen. This may, or may not work, depending on your KDE configuration. Alternatively, you might have to run "lg3d-app-full". (useful for non-KDE environments).

8. Resizing a window is a difficult task with LG3D, mainly because of total lack of configurability. I succeeded in resizing window, only when I moved the application window that way, so I could target window's bottom-right corner. Under normal WM (read: kwin) every corner will do. Screenshot:




9. Besides the capability to run normal 2D X-applications, LG3D offers a new set of LG3D native applications. One of those is the 3D photo viewer. Screenshot:

NOTE: Most LG3D applications today are just eye-candy demos, lacking any real working engine.

# Troubleshooting

If your LG3D crashes on start or doesn't starts at all, chances that is something going bad with your 3D setup - OpenGL. Try to:

1. Install an accelerated driver.
2. Disable XGL

If your LG3D runs, but without X-apps integration try to:

1. launch "postinstall" script
2. full restart your computer (X-restart didn't help me)

# Current Problems, That I Could not Resolve Alone (but theoretically resolvable)

1. Source Code. The project is under GPL, but I couldn't find sources on their site. Just the CVS, but those are not sources for the v1.0. Besides I want it in tarball format. (Linux standard)
2. Generally poor user documentation. Especially Troubleshooting section.
3. Ugly fonts. Rendering aliased fonts in 3D space produces nearly unreable results. I think that both AntiAliased fonts and 3D AntiAliasing must work together to resolve that issue.
4. Too small buttons on window's top-right corner. This usability issue prevents me from successfully manipulating my windows.

# Totals

Overall, Excellent Project. It's pretty stable (with some minor issues), but way more stable than I expected. Also... it is fast - the graphics rendering is Very fast on my old AMD Athlon XP 1.6 GHz system with nVidia GeForce FX 5200 3D card.

Future: In the near future, I hope, LG3D will be available as a RPM for openSUSE. In the distant future - I don't know exactly where it is taking us, but, to me, it is clear, that we need something more powerful, in terms of raw features KDE kwin - wins easily - but not in 3D.

That is - we (the OSS community) either need to improve kwin to become "Scene Manager", rather than just "Window Manager" -or- improve LG3D to have the power and configurability of kwin. It is up to developers to decide which approach is better, and it's up to developers to decide wherever to go Java or C++ way. LG3D, as it is now, is an excellent test-bed for future-generations of 3D Desktops, that tests futuristic concepts. I like the concepts of LG3D, but not the current implementation.

# For More Information

Getting Started: https://lg3d.dev.java.net/lg3d-getting-started.html.

Forum: http://forums.java.net/jive/forum.jspa?forumID=80.

Mailing-Lists: https://lg3d.dev.java.net/servlets/ProjectMailingListList.

Article about the project: http://java.sun.com/developer/technicalArticles/J2SE/Desktop/lookingglass/

Nice demo videos: http://youtube.com/results?search_query=looking+glass+3d&search=Search

# 4.11. Using Qemu: the Open-Source x86 PC Emulator

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$Revision: 06 $
$Date: 2007-01-15 $

Qemu is very nice generic computer emulator. Qemu is a user-space program, capable of running on any host architecture, multiple Operating Systems, and emulating many guest modes and/or architectures. The most frequent use, is as an x86 PC Emulator.

## Scenarios

- You want to run some Operating System in emulated mode.
- You want to test new software under different OSes for compatibility.
- You want to build virtual networks.
- Server Consolidation: You want to remove old physical servers, and move their functions on new hardware. It will improve server uptime, reduce power consumption, and will enable easier managing of virtual machines. Most important of all: It will save physical space -- real estate.
- It is not useful for gaming, as it does not support 3D Graphics acceleration.

It is not as fast as other solutions, such as the more popular Xen. But it's strength over Xen, is that it can run unmodified OSes, on any host CPU, including non-x86. When comparing to VMware, then Qemu has one advantage: it's Open-Source.

## Understand what are you doing

You are going to emulate a full PC box, all standard hardware, including: normal video card (not 3D accelerator), sound card, network card, RAM, hard disk, CD-ROM, motherboard, BIOS, and CPU.

On top of it, you will want to run a real Operating System, so make sure you host system has enough CPU power, hard disk space and RAM to handle the load. Main problem here is RAM. I do not recommend systems with less than 512 MB of RAM to even try this. 2 Gigs of RAM is more appropriate for serious use.

Generally I do *not* recommend using `qemu` for emulating heavy guest OSes such as SUSE 10.x / Windows XP, but for emulation of lighter Windows 95/98 it will do just fine.

## Terminology

- Host - your real computer, on which the emulator software runs.
- Guest (VM) - your emulated computer, virtual machine, or VM for short, this is *what* you are trying to emulate. Your target. It can be the same, or very different from your real system. For example, your host can be a Pentium III PC, while your guest can be a Sony Playstation. Of course, Qemu cannot simulate Playstations, so look at different software. It's just important that you understand those two basic concepts.
- Emulation - this technique allow conversion of commands, or instructions, one by one, by using software.

  There are more optimized algorithms exists, that have different names, such as "Dynamic Execution", "Virtualization", whatever...

  Those are software-optimized or hardware-optimized version of the above. As long as everything works as expected, there are no big difference to the end-user.

# Procedure

Generally, this procedure does not requires `root`, with the exception of Qemu system-wide installation.

1. Please make sure that Qemu is installed:

   ```
   suser@localhost:~> rpm -q qemu
   qemu-0.8.2-22
   ```

   If not, please install Qemu first, from DualDVD (included only with boxed version of openSUSE) or from the Internet mirrors, such as: http://suse.inode.at/opensuse/distribution/10.2/repo/oss/suse/i586/

2. I recommend, that you create a qemu virtual machines directory: (for example "~/qemuvm" in your home directory)

   ```
   suser@localhost:~> md ~/qemuvm
   suser@localhost:~> cd ~/qemuvm
   suser@localhost:~/qemuvm>
   ```

   This is not a strict requirement, but helps organizing once you get several dozens of VMs.

3. Create a qemu virtual hard disk image, preferably with qcow format: (for syntax help use `qemu-img` command)

   ```
   suser@localhost:~/qemuvm> qemu-img create -f qcow myharddisk.qcow 10G
   ```

4. Start qemu:

   ```
   suser@localhost:~/qemuvm> qemu -m 256 -hda myharddisk.qcow -cdrom /dev/cdrom -boot d
   ```

5. Alternatively, you can start qemu with emulated CDROM:

   ```
   suser@localhost:~/qemuvm> qemu -m 256 -hda myharddisk.qcow -cdrom suse-dvd.iso -boot
   ```

   This method installs faster, because it bypasses the slow access time of a physical CD-ROM, but it requires you to manually prepare an ISO CD image file beforehand (can be done via KDE K3B). I recommend using this technique. As a bonus, your real CD-ROM device will live longer!

6. After the OS installed, just change the "-boot d" to "-boot c", so the VM will boot from the virtual hard disk.

# Additional Modules

By default, Qemu is just a user-space text-controlled application, without any GUI. Unfortunately, none of those modules comes with openSUSE, so you will have to google, download sources and compile yourself.

The graphics user interface front-end module is called QtEmu, it is Open-Source, cross-platform and based on Qt4. This GUI is very nice, stable, and I really recommend it to users.

You can get it at: http://www.kde-apps.org/content/show.php?content=50780

Now, besides a GUI, there are 3 acceleration modules. You can choose one, or run Qemu without any. They may accelerate your Qemu up to x20 fold ! Of course acceleration of those 3 modules requires, that both host and guest be x86 systems. In addition to that KVM requires Intel's VT-capable CPU (read: Intel Core 2 E6000+ series CPU).

- KVM - Kernel Accelerator Module. OSS. Requires Intel's Vanderpool Technology, AMD Pacifica. Part of official Linux kernel since 2.6.20.
- QVM - Kernel Accelerator Module. OSS. Doesn't requires special CPUs.

- Kqemu - Kernel Accelerator Module. Non Free Software. Doesn't requires special CPUs. The oldest module developed.

Now, with introduction of Intel's VT and Linux's KVM, Qemu+KVM became more similar to Xen+VT now, as both apps perform fast now, require special CPUs, and work with unmodified guest OSes now.

## For More Information

Qemu Home Page: http://fabrice.bellard.free.fr/qemu/

An Introduction to Virtualization: http://www.kernelthread.com/publications/virtualization/

For more information about my original Qemu how-to: http://en.opensuse.org/Using_Qemu

Run `qemu` and `qemu-img` commands without parameters.

# 4.12. How-To Change Your MAC Address

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$Revision: 04 $
$Date: 2007-01-24 $

## Scenario

You want to test a layer 2 firewall via MAC address spoofing, or you may just want to learn a bit of networking.

This How-To uses standard GNU/Linux commands, therefore it is not specific to openSUSE.

## Procedure

The commands are very simple: (you must be logged in as `root`)

```
# ifconfig eth0 down
# ifconfig eth0 hw ether AA:BB:CC:DD:EE:FF
# ifconfig eth0 up
```

Now check that it is actually been set:

```
# ifconfig eth0
```

## Understanding

OK, here we go; First understand: Your MAC address, despite is physically burned into a NIC (LAN card), *can* be changed. It is due to the fact, that it is not the LAN card, that builds frames (as I thought originally), but it's the driver. This means, that the driver can build non-standard frames, such as with a non-standard MAC address, or even completely non-standard sized frames, such as IEEE 802.1q frames for VLANs, or even Jumbo frames (with 9000 bytes, instead of 1500 bytes of payload).

Because it is driver dependent, your NIC driver must support that feature in order to succeed. Just don't blindly believe hardware manufacturers, saying that model X or model Y doesn't support this or that feature. With some extra work on the drivers part, everything is possible. And since we are an Open-Source community, we have the power to change it.

## Procedure to get the original MAC address from ROM

Since we changed the MAC address in the driver, the only way to change this back is to reload the driver. Make sure you are logged in as `root`.

1. Find out, which driver is used with:

   ```
   localhost:/ # ethtool -i eth0
   driver: via-rhine
   version: 1.4.1
   firmware-version:
   bus-info: 0000:00:12.0
   ```

   OK, now we just found, that our driver is named: “via-rhine”.

2. Unload the networking driver with:

   ```
   localhost:/ # rmmod via-rhine
   ```

   WARNING: It will stop all the network cards that use this driver, so, if you're running a multi-NIC machine, proceed with caution.

3. Load the networking driver back with:

   ```
   localhost:/ # modprobe via-rhine
   ```

4. Start the network card with:

   ```
   localhost:/ # killall dhcpcd
   localhost:/ # dhcpcd eth0
   ```

   It will kill all the problematic (stucked) processes of the Dynamic Host Configuration Protocol Client Daemon, and restart it again on eth0 NIC.

5. Now check that it is actually been reverted to original value:

   ```
   # ifconfig eth0
   ```

## Troubleshooting

May happen, that after reboot, your NIC will fail to start. In this case do:

Yast->Network Devices->Network Card->Traditional Method->select a NIC->delete, then: ->edit->next->Finish.

# 4.13. How-To Access COM Port (RS-232 client/server)

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$Revision: 05 $
$Date: 2007-01-24 $

## Scenario

You have a device, which requires access via COM port; It can be an ancient Terminal Server, or a Cisco Router for example. You are basically converting your Linux PC to a “Terminal Emulator”, or “RS232 client”, if you wish.

## Procedure

This How-To uses standard GNU/Linux commands, therefore it is not specific to openSUSE.

Make sure you have `screen` installed, with:

```
rpm -q screen
```

If not, install it. Fortunately it is included on openSUSE CDs and DVD.

The command are very simple: (you must be logged in as `root`)

```
# screen /dev/ttyS0
```

or access any other COM port by changing the last digit (0...7).

To exit screen use: “ctrl+a”, then “ctrl+\”, “y”.

# Understanding

The COM Port, which has more professional names such as EIA/TIA-232, RS232 or V.24 is an ancient serial networking and communications technology standard developed in the 1960's. It could be used to connect 2 computers together (DTE-to-DTE), or computer and an external modem (DTE-to-DCE). Some other use cases include connection to UPS (for control), and to mice. Older mice (before 1997) used exclusively this technology. Usually it has 9-pin or 25-pin “D”-like physical interface. Today it is superceded by the Ethernet and USB, but has still accasional use here and there. On modern motherboards, it can be either 9-pin cyan-colored interface (according to PC-Color-99 specification) or lack completely.

Because the standard is extremely successful, old and open, it is supported by *ALL* Operating Systems. (which cannot be said of USB)

# Converting your Linux box to RS-232 Server

Besides being a client, Linux has the option of providing a server, that is, a TTY line to other clients connecting to it by way of Serial COM interface.

Primary thing to do, is to edit your /etc/inittab, and uncomment the following line, by removing the first byte:

```
#S0:12345:respawn:/sbin/agetty -L 9600 ttyS0 vt102
```

This will allow to connect to your COM port, after the Operating System is up and running, but what if you want to connect to your system earlier?

Another thing to do (optionally) is to modify your /boot/grub/menu.lst so you can connect to your Linux system on the bootloader stage, plus see Linux kernel messages.

Below you see a modified GRUB menu for openSUSE 10.2 system, so similar technology can be applied to other SUSE Linux systems as well.

```
# Modified by YaST2. Last modification on Fri Dec  8 16:25:38 UTC 2006
default 0
timeout 8
##YaST - generic_mbr
#commented "#gfxmenu", because RS-232 disallows GUI.
#gfxmenu (hd0,0)/boot/message
#
##YaST - activate
serial --unit=0 --speed=9600 --word=8 --parity=no --stop=1
terminal serial console

###Don't change this comment - YaST2 identifier: Original name: linux###
title openSUSE 10.2
```

```
root (hd0,0)
kernel /boot/vmlinuz-2.6.18.2-34-default root=/dev/hda1 showopts console=tty0 console=t
initrd /boot/initrd-2.6.18.2-34-default
```

Let me explain all the modifications:

GRUB-section: You must comment the gfxmenu (graphics menu). RS-232 allows text-only.

```
#commented "#gfxmenu", because RS-232 disallows GUI.
#gfxmenu (hd0,0)/boot/message
```

GRUB-section: You must enable serial.

```
serial --unit=0 --speed=9600 --word=8 --parity=no --stop=1
terminal serial console
```

Kernel-section: To enable kernel messages on COM port, during boot: add console=tty0 console=ttyS0,9600n8 as your kernel boot parameters, plus remove any vga=0x317 and splash=silent kernel boot parameters. The final result should look like this:

```
kernel /boot/vmlinuz-2.6.18.2-34-default root=/dev/hda1 showopts console=tty0 console=t
initrd /boot/initrd-2.6.18.2-34-default
```

## For More Information

info screen

Tip: combine this how-to with shared-sessions how-to for excellent effect.

Wikipedia about COM port: http://en.wikipedia.org/wiki/RS232.

A major, feature-full article about Linux as a RS-232 Server: http://www.linux.com/howtos/Remote-Serial-Console-HOWTO/.

# 4.14. How-To Show Amount of Video RAM

Alexey Eremenko "Technologov" <al4321@gmail.com>
$Revision: 02 $
$Date: 2007-01-25 $

## Scenario

There are cases where you need to know how much video RAM you have. Usually it is before you install a 3D game or an application that uses 3D graphics intensively.

## Procedure

```
grep -i ram /var/log/Xorg.0.log; grep -i mem /var/log/Xorg.0.log
```

## The Problem

Unfortunately, unlike Windows, The Linux Operating System has no easy way to view the amount of video RAM. After long discussion and community debates about different possible commands, (like lspci, KInfoCenter...) the command above was the only one to be found stable (i.e. works on all tested systems, other commands break on different systems).

So scanning the log file of X Window System is the only reliable answer so far. I hope a feature to view VRAM will be integrated into Yast at some point in the future.

This info is sometimes important to know. Especially given the fact that some old ATI and S3 cards do not display their Video BIOS/RAM on boot.

If you just wanna know which device you are running you can use either:

sax2 -p

-or-

lspci -v -v

NOTE: I have tested dozens of commands. Some fail on nVidia, some on ATI cards, some on VMware virtual driver. I found no 100% reliable way to view the amount of video RAM. If you think you have found such a command, feel free to email me at: al4321@gmail.com

## For More Information

The original How-To from openSUSE wiki: http://en.opensuse.org/How-to_view_the_amount_of_Video_RAM_on_Linux.

# 4.15. Interoperability: Software Equivalents Table

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$Revision: 10 $
$Date: 2007-01-26 $

Here, I will try to build a software equivalents table of products available for Microsoft Windows XP and openSUSE platforms, but not necessarily comes bundled with those platforms. It is intended for Windows users that want to replace their lovely software with a Linux equivalent.

Here, I will not try to make a full review of listed software, neither give a relative score, so I will leave it as an exercise to the reader to learn the software, and get personal feelings of each of the applications in the table below:

| Type | Windows XP | openSUSE |
|---|---|---|
| Standard Windows applications: | | |
| File Manager | Windows Explorer | KDE Konqueror |
| Web Browser | Internet Explorer | Mozilla FireFox |
| Text Editor | Notepad | KDE Kate |
| Painter | Paint | KDE KolourPaint |
| Command-Line prompt | cmd | KDE Konsole |
| MultiMedia Player | Windows Media Player | KDE Kaffeine |
| Calculator | Calc | KDE Kcalc |
| Standard Office applications: | | |
| Office Suite | Office-2003 | OpenOffice |
| Document | Office-Word-2003 | OpenOffice Writer |
| Spreadsheet | Office-Excel-2003 | OpenOffice Calc |
| Presentation | Office-PowerPoint-2003 | OpenOffice Impress |
| Database | Office-Access-2003 | OpenOffice Base |
| E-mail | Office-Outlook-2003 | Mozilla Thunderbird |
| Calendar | Office-Outlook-2003 | KDE KOrganizer |

```
Extended Windows applications:
Image Viewer            ACDSee                  KDE Gwenview
Archiving               WinZip                  KDE Ark
WinAmp-style Player     WinAmp                  XMMS
CD Burning              Nero                    KDE K3b
CD Cover Design         Nero Cover Design       KDE Kover
FTP Client              WS FTP Pro, Filezilla   KDE Konqueror
SMB Client              Windows Explorer        KDE Konqueror
Hex Editor              Visual Studio           KDE KHexEdit
Professional Painter    Photoshop               GIMP
Twin-Panel File Manager Norton Commander        KDE Krusader
PC Emulator             Virtual PC              Qemu+QtEmu
Development Environment Visual Studio           KDE KDevelop
HTML WYSIWYG Editor     Dreamweaver             Nvu
Remote Access           Remote Desktop          FreeNX
IRC Client              mIRC                    KDE Konversation
Download Manager        Download Accelerator    KDE KGet

Standard Windows internal components:
Control Center          Control Panel           SUSE Yast
Display Manager         Windows Login           KDE KDM
Window Manager          XP Window Manager       KDE kwin
Package Manager         Add/Remove Programs     RPM, Yast, klik
Task Manager            Task Manager            KDE kSysGuard
Boot Loader             NTLDR                   GRUB
Firewall                Windows Firewall        SUSE Firewall

Extended Windows internal components:
Desktop Manager         nVidia workspaces       KDE pager

Standard Windows Server 2003 components:
User Authentication     Active Directory        LDAP (?)
HTTP Web Server         IIS                     Apache
FTP Server              IIS                     vsftpd
Remote Access           Terminal Services       FreeNX
Telnet Server           MS Telnet Server        telnet-server
SMB File Sharing        Windows File Sharing    samba
DNS Server              DNS Server              yast2-dns-server
DHCP Server             DHCP Server             dhcp-server

Extended Windows Server 2003 components:
SQL Database Server     SQL Server              mysql
e-mail                  Exchange                sendmail (?)
TFTP Server             Solarwinds TFTP         Yast TFTP

Specials without equivalents:
3D Benchmarks           3D Mark 2000...06       -
3D Performance Monitor  Fraps                   -
3D Desktop              -                       Looking Glass 3D
Application Security    -                       AppArmor

Type                    Windows XP              openSUSE
```

Comparison of both OSes rools: both Open-Source and proprietary applications are allowed, preference given to Microsoft applications on Windows and to Open-Source applications with graphical user interface (GUI) on Linux.

## About Interoperability

Interoperability is a new series of my documentation-set. It describes the working relationships between different Operating Systems, and helps build a healthy openSUSE integration into existing Windows environments.

## For More Information

There are several resources, that are spread across the Internet. One of them is: http://www.linuxrsp.ru/win-lin-soft/table-eng.html.

# 4.16. How-To Connect Remotely via Telnet

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$Revision: 06 $
$Date: 2007-01-26 $

## About

Telnet (TELetype NETwork) is a very old open-standards client/server protocol, that allows for text-based remote-access. It's advantage is: that it is fast and supported by almost all Operating Systems, that support TCP/IP. Telnet is TCP/IP based, and replaces the older, non-IP based, RS-232 remote-access networks. Unfortunately, this protocol is insecure and, therefore, is strongly not recommended to be used over the Internet.

On modern networks, Telnet is replaced by SSH for security reasons.

This document describes how to configure openSUSE as a telnet server, and how to connect to other telnet servers.

## Procedure for Telnet Client

To connect to others use: (as normal user)

```
telnet 127.0.0.1
```

the 127.0.0.1 can be any IP address or DNS name.

## Procedure for Telnet Server

1. First enter `root` mode, by using the command `su`. then we must check if our software is installed:

   ```
   # rpm -q telnet telnet-server
   telnet-1.2-33
   telnet-server-1.2-33
   ```

2. The output above shows packages versions, which means both are installed. If not, then install them first with Yast. Fortunately, telnet client and server packages are included with openSUSE.

   After the packages installed, use this command to configure Telnet server:

   ```
   # chkconfig telnet on
   # rcxinetd restart
   # chkconfig xinetd on
   ```

3. If your firewall is on (default openSUSE setup), you must configure your firewall to accept TCP Port 23, to allow Telnet traffic to pass from remote computers. To do so:

   Yast Control Center->Security and Users->Firewall->Allowed Services->Advanced->TCP Ports=23->OK->Next->Accept

# Changing Telnet TCP Port on Client

On the telnet client, you simply type:

```
> telnet localhost 23
```

where 23 is your TCP port.

# Changing Telnet TCP Port on Server

On telnet server, you must change the file "/etc/services", because by default it works via xinetd super-server. The standard telnet works on TCP port 23. Change the lines where port 23 is assigned to telnet to some other port. To find out on which lines it is, use:

```
# cat -n /etc/services | grep " 23/"
132  telnet          23/tcp    # Telnet
133  telnet          23/udp    # Telnet
```

Basically it reports, that you need to edit lines 132 and 133. To set the TCP port, change the value "23" on both lines to the desired one. Recommended values are between 1024...65535.

After that, restart the service with:

```
# rcxinetd restart
```

# Enabling Remote Login for `root`

NOTE: Remote root login is disabled for a good reason. Don't do this unless you know exactly the possible consequences.

In normal case `root` isn't allowed to login over telnet (security reasons). To change this you have to edit the file "/etc/pam.d/login" and change :

```
auth     [user_unknown=ignore success=ok ignore=ignore auth_err=die default=bad]pam_secu
```

to: (basically add "#" at start of line)

```
#auth     [user_unknown=ignore success=ok ignore=ignore auth_err=die default=bad]pam_se
```

After that, restart the service with:

```
# rcxinetd restart
```

# Troubleshooting and Diagnostics

Telnet Server config file is located at: "/etc/xinetd.d/telnet".

See if the server is running:

```
# chkconfig --list
```

See which TCP port are open locally:

```
# nmap localhost
```

To use this, you must install nmap first.

Alternatively, you can see which post are listening by:

```
# netstat -ln | grep -vi unix
```

## For More Information

Wikipedia page: http://en.wikipedia.org/wiki/TELNET.

original openSUSE wiki page: http://en.opensuse.org/Telnet_Server_HOWTO.

the command: `telnet /?` and respective man page.

Standard TCP/UDP port file is located at: "/etc/services".

# 4.17. How-To Enable Mouse in Console (with gpm)

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$Revision: 05 $
$Date: 2007-01-23 $

## Scenario

You may want to work with openSUSE, but without graphical user interface, in pure text-mode. To switch there, you can use: “Ctrl+Alt+F1...F6” for six different console sessions, available by default. To go back to GUI mode use: “Ctrl+Alt+F7”. The reasons to switch to text-mode may differ: from nostalgic, to learning Linux to save some CPU cycles and RAM.

By default, you work in GUI, that has mouse already enabled via X Window System. The Linux console cannot use mouse driver from X, and therefore, has a separate driver, called `gpm`.

## Procedure

To enable mouse in console, we use the `gpm`. It works by taking the raw device file, and applies some algorithms to it, to convert it to a mouse pointer.

1. Check if `gpm` is installed with:

   ```
   > rpm -q gpm
   ```

   If not, then install it first. Fortunately, the gpm package is included with openSUSE.

2. Unfortunately, gpm cannot autodetect mouse type, so we must specify this manually.

   For PS/2 mouse use: (must be `root`)

   ```
   # gpm -m /dev/input/mouse0 -t ps2
   ```

   The “-m” parameter stands for “mouse-device”, while the “-t” parameter stands for “mouse-type”, or protocol.

   For my USB mouse the same command worked. Somehow it works with the PS/2 protocol.

## For More Information

For more information about `gpm` use:

```
# gpm -h
```

or

```
> man gpm
```

# 4.18. How-To Search for Abbreviations (with `wtf`)

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$Revision: 03 $
$Date: 2007-01-26 $

## Scenario

You have came across a series of strange capital letters, with an unknown meaning. An excellent utility exists to solve that issue.

`wtf` is part of “bsd-games” package, that came to the Linux world from NetBSD project (thanks them!).

## Procedure

1. First, make sure that `wtf` is installed, by doing:

   ```
   > rpm -q bsd-games
   bsd-games-2.13-386
   ```

   If not, then install it first. Fortunately, the bsd-games package is included with openSUSE.

2. Start by typing:

   ```
   > wtf AFAIK
   AFAIK: as far as I know
   ```

   Discovering the rest will be left as an exercise to the suser. (SUSE user)

## For More Information

Newest abbreviants dictionaries from NetBSD CVS: http://cvsweb.netbsd.org/bsdweb.cgi/src/share/misc/acronyms. and http://cvsweb.netbsd.org/bsdweb.cgi/src/share/misc/acronyms.comp.

Online abbreviations finder: http://www.acronymfinder.com.

# 4.19. How-To Customize Console

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$Revision: 03 $
$Date: 2007-02-02 $

## About

The Linux Console is a very powerfool tool, but it requires some knowledge and experience to get used to.

You must destinct between a real console, that runs in full-screen mode, from a console simulation that runs under X Window System (xterm or KDE Konsole). This article is going to describe customization of a real console.

You may want to work with openSUSE, but without graphical user interface, in pure text-mode. The reasons to switch to text-mode may differ: from nostalgic, to learning Linux to save some CPU cycles and RAM.

# Invoking

To switch there, you can use: “Ctrl+Alt+F1...F6” for six different console sessions, available by default. To go back to GUI mode use: “Ctrl+Alt+F7”.

# Adding Mouse

Look at: “How-To Enable Mouse in Console (with `gpm`)” in this book.

# Customizing Resolution

On the real console, you can change resolution via VGA BIOS modes. Since BIOS is only accessible from 16-bit mode, it must be set up before the Linux kernel loads, on the boot loader stage.

```
localhost:/ # cat /boot/grub/menu.lst | grep kernel
kernel /boot/vmlinuz-2.6.18.2-34-default root=/dev/hdd3 vga=0x317    resume=/dev/hdd11 
...
output omitted
```

As you see here, after the kernel file, the kernel parameter starts. You see something like: “vga=0x317” which is the VGA mode.

Below you see a table of different VGA modes, so you can modify the file according to your taste:

```
FRAMEBUFFER RESOLUTION SETTINGS
#      +-------------------------------------------------+
#           | 640x480    800x600    1024x768   1280x1024
#       ----+--------------------------------------------
#       256 | 0x301=769  0x303=771  0x305=773   0x307=775
#       32K | 0x310=784  0x313=787  0x316=790   0x319=793
#       64K | 0x311=785  0x314=788  0x317=791   0x31A=794
#       16M | 0x312=786  0x315=789  0x318=792   0x31B=795
#      +-------------------------------------------------+
```

Also you can remove this parameter or make it “vga=0” so it will start like a real DOS mode, with 80x25 character resolution. Alternatively set it to: “vga=ask” so the computer will ask you every time on boot which VGA mode to use.

# Navigation

To scroll console up/down use: “Shift+Page Up” and “Shift+Page Down”.

WARNING: This will work as long as you are on the same console. If you switch, your scrolling history will be lost.

# For More Information

For Customizing Resolution you can read the file: /usr/src/linux/Documentation/svga.txt (requires Linux kernel source code to be installed)

# 4.20. Interoperability: Accessing Linux Filesystems from Windows

Thomas Schraitle
$Date: 2007-02-13 01:54:25 +0100 (Di, 13 Feb 2007) $
Just begun

Reading files from a Windows filesystem, be it VFAT or NTFS, is supported by Linux. However, the other way around is not very common. If you have to access your files on a Linux partition without rebooting, you need a convenient solution. The following section describes how to install drivers for Windows and how to use it.

### About Reading and Writing from Windows to Your Linux Partitions

The description in this section is used mainly to have access to your Linux partitions—mainly, to read files and directories. Writing from Windows to Linux *might* work, but it is not guaranteed. There can be subtle differences. Make sure you have always a backup of your important data.

## Requirements

You need the following:

- A running Windows system.
- One or more Linux partitions with a Ext2/3 or Reiser filesystem.
- Adminisrator permissions for this procedure on your Windows system.

## Procedure

At the moment, you can read EXT2/3 and ReiserFS filesystems under Windows.

### Installing Filesystem Driver for EXT2/3

To install a driver for a Linux EXT2/3 filesystem, proceed as follows:

1. Start your Windows system and log in as system administrator.
2. Download the EXT2/3 filesystem driver for Windows from http://www.fs-driver.org.
3. Double-click on the file  to follow the instructions.
4. Choose the drive letters for your Linux partitions in the last step, for example  for home. Do not assign a drive letter to a swap partition.
5. Open Explorer. You can see your assigned drive letters.

### Do not write on EXT3 partitions

At the moment, it is possible to read from EXT3. However, you should be very careful to write to an EXT3 partition. EXT3 is a journaling filesystem in comparition to EXT2. The driver does probably not recognize nor have implemented the journaling functionality in this driver.

## Installing Filesystem Driver for ReiserFS

# 4.21. Using VirtualBox: the new era User-Friendly x86 PC Virtualizer

Alexey Eremenko "Technologov" <al4321@gmail.com>
$Revision: 214 $
$Date: 2007-03-07 22:25:51 +0100 (Mi, 07 Mär 2007) $

From original website: “InnoTek VirtualBox is a general-purpose full virtualizer for x86 hardware. Targeted at server, desktop and embedded use, it is now the only professional-quality virtualization solution that is also Open Source Software.”

VirtualBox is a full virtualization solution, that virtualizes the CPU and emulates the rest of PC hardware.

It is similar to other emulators and virtualizers such as Qemu/VMware Workstation/VirtualPC, but it is the only Open-Source software, that has a nice Qt3-based GUI. Unfortunately, all other Open-Source solutions (Bochs/Qemu/Xen) lacking a good GUI and are not User-Friendly. So this is a huge advantage for VirtualBox.

So let's summarize some of it's current features: (as of version 1.3.6)

- User-Friendly touch
- GUI (Qt3-based)
- x86 on x86 full virtualization (doesn't require Vanderpool Technology, but can use if available)
- Supports both Windows and Linux (both Host and Guest)
- GuestVM additions (for Windows and Linux)
- Has 2 versions: closed-source (full, also available as freeware) and open-source (OSS, GPLed)
- Very fast (one of the fastest solutions available)
- Stable (compared to other Open-Source solutions)
- Support Multi Processing/Multi Core CPUs (on host only)
- Networking (NAT+Host networking via Bridging+Internal)
- Audio (OSS+ALSA)

The future release features will include:

- x86-64 support on both Hosts and Guests
- Solaris UNIX support (as both Host and Guest)
- Serial port emulation
- More Stablility

This software requires that both Host and Guest be x86 compatible systems.

I consider this a new era, because until now, Open-Source virtualizers lagged far behind the commercial ones in the ease-of-use and GUI areas. This is revolutionary, because it is the world's first user-frendly Open-Source virtualizer.

This is our community's chance to build a high-quality, user-frendly x86 virtualizer to counter VMware and Microsoft's VirtualPC. I call for community help (see “community” at the More Info section).

# Scenarios

- You want to run some Operating System in guest mode.
- You want to test new software under different OSes for compatibility.
- You want to build virtual networks.
- Server Consolidation: You want to remove old physical servers, and move their functions on new hardware. It will improve server uptime, reduce power consumption, and will enable easier managing of virtual machines. Most important of all: It will save physical space -- real estate.
- It is not useful for gaming, as it does not support 3D Graphics acceleration.

# Understand what are you doing

You are going to emulate a full PC box, all standard hardware, including: normal video card (not 3D accelerator), sound card, network card, RAM, hard disk, CD-ROM, motherboard, BIOS, and virtualize CPU.

On top of it, you will want to run a real Operating System, so make sure you host system has enough CPU power, hard disk space and RAM to handle the load. Main problem here is RAM. I do not recommend systems with less than 512 MB of RAM to even try this. 2 Gigs of RAM is more appropriate for serious use.

`VirtualBox` is optimized for running heavy guest OSes such as Windows 2000/XP and openSUSE. For running older Windows 95/98, `qemu` might be a better solution.

# Terminology

Host
: Your real computer, on which the emulator/virtualizer software runs.

Guest (also known as VM=Virtual Machine)
: Your emulated computer, virtual machine, or VM for short, this is *what* you are trying to emulate. Your target. It can be the same, or very different from your real system.

  For example, your host can be a Pentium III PC, while your guest can be a Sony Playstation. Of course, VirtualBox cannot emulate Playstations, so look at different software. It's just important that you understand those two basic concepts.

Emulation
: This technique allow conversion of commands, or instructions, one by one, by using software.

  There are more optimized algorithms exists, that have different names, such as “Dynamic Recompilation”, “Virtualization”, whatever...

  Those are software-optimized or hardware-optimized version of the above. As long as everything works as expected, there are no big difference to the end-user.

  Note that VirtualBox is considered to be a virtualizer. However most of the system hardware is emulated, just the CPU is being virtualized. The USB and CD-ROM can be virtualized as well.

  For more technical explanation, look: http://www.virtualbox.org/wiki/Virtualization.

# Basic Configuration Procedure

1. Download VirtualBox from http://virtualbox.org/wiki/Downloads. Choose “VirtualBox for Linux Hosts” and the “openSUSE RPM” version. This will download a precompiled freeware (proprietary version, free for Personal Usage). I have decided to use this version as it has support from InnoTek, and it is feature-full.

   To install from RPM, just double-click it in konqueror, select “Install Package with Yast”, it will ask for `root` password, and then it will automatically install the package.

   Alternatively you can download the OSS version. See at “More info” at bottom of this article.

   If this worked fine, please skip the next section.

2. If installing from RPM doesn't works for some reason, please install from multi-distro installer: Download VirtualBox from http://virtualbox.org/wiki/Downloads. Choose “VirtualBox for Linux Hosts” and the “All distributions” version. This will download a precompiled freeware (proprietary version, free for Personal Usage).

   When installing from “multi-distro”, you also need to install kernel-source and gcc from Yast to compile distro-specific host-side drivers. This will be done automatically.

   To actually install from “multi-distro” use:

   ```
   # sh ./VirtualBox_1.3.6_Linux_x86.run install
   ```

3. I recommend, that you create a virtual machines directory: (for example in your home directory)

   ```
   tux@localhost:~> md ~/vm
   ```

   This is not a strict requirement, but helps organizing once you get several dozens of VMs.

4. Setup your user(s) to be part of “vboxusers” group. *Yast > Security and Users > Group Management > vboxusers (group) > Edit > check tux (user) > Accept > Finish*

   ## Be Careful With Your Setup

   This step is critical, one mistake and VirtualBox will not work !

5. Restart your system.

6. Start VirtualBox (it apeears on your SUSE/KDE menu, you can search for it, or go directly to: *Applications > System > Emulator > VirtualBox* )

7. Configure VirtualBox to respect your ~/vm settings: “File->Global settings”, configure both VDI files and machines to ~/vm

8. Create a new VM named “openSUSE”

9. Set OS type to “Linux 2.6” (as far as I know it doesn't really affects anything, except default RAM and Disk size)

10. Set Memory to 256 MB (this is how much RAM our VM will have)

11. *Virtual Hard Disk > New > Next > Dynamically Expanding Image > Next > Finish*

12. Great, now we almost completed basic settings for our VM.

13. To use a real CD-ROM drive do: Select your newly created VM: *VM > Settings > CD-ROM > Mount CD-ROM Drive > Host CD-ROM Drive > /dev/cdrom > OK*

Alternatively, you can use an ISO CD-ROM image (virtual CD-ROM) with: Settings->CD-ROM->Mount CD-ROM Drive->ISO Image File->(select an ISO image)

14. If you have chose to install from a real DVD-ROM, then insert a openSUSE DVD now.

15. If you want Audio on your VM, enable it now with: *VM > Settings > Audio > Enable Audio > Host Audio Driver > ALSA > OK*

16. Simple Networking is enabled by default, so don't touch this setting.

17. Start VM ! The install should go smoothly, so Enjoy !

# Setting up Guest VM Additions

After your VM has been started, you must do: "Devices->Install Guest Additions...".

### Warning

Those cannot be uninstalled, so prior to installing, I recommend you to backup your virtual Hard Disk !

If your guest OS is Windows 2000 or XP, then no problems should arise.

If your guest OS is openSUSE, then your X-Server resolution may go huge due to bug in LinuxAdditions, and your system may become unmanageble. Workaround: set your video RAM to 1 MB.

In any case, a virtual CD-ROM will appear in your VM, so you can setup either VBoxGuestAdditions.exe on Windows Guest or on Linux guest do:

```
# sh ./VBoxLinuxAdditions.run
```

NOTE: That linux-sources and gcc are required for successful install on Linux guest.

# Advanced Topic: Networking via Host Bridging

In previous section, I said that simple networking is already pre-configured. While true, this so-called simple networking allows for client-side connections only, but disallows me to use complex configurations for servers and virtual networks. VirtualBox has option to use Host netwroking, via TAP interfaces. Both TAP interfaces and bridging is meant to be provided by the host OS.

The required components, which your Host OS is required to have, are:

- TAP kernel module: check for /dev/net/tun. (exists in openSUSE, pre-installed by default)
- Userspace app to manage Bridges. bridge-utils. (exists in openSUSE, but must be installed). Please install it via Yast.
- Userspace app to manage TAP interfaces priviledges. tunctl. (not in openSUSE, must be downloaded).

1. As we said earlier, tunctl not included with openSUSE. It is part of User-Mode Linux, or UML for short, and can be downloaded from: http://prdownloads.sourceforge.net/user-mode-linux/uml_utilities_20040406.tar.bz2 The setup procedure is standard: (make sure you have gcc)

   ```
   # tar xvf uml_utilities_20040406.tar.bz2
   # cd tools/
   # make
   # make install
   ```

   Now you have tunctl, which is a necessary utility to manage TAP interface priviledges.

2. Create TAP interface. Set priviledges to user “tux”.

```
# tunctl -t tap0 -u tux
# ifconfig tap0 0.0.0.0 up
```

3. Create a bridge, and add interfaces to it:

```
# brctl addbr br0
# brctl addif br0 eth0 tap0
```

4. Start a DHCP client on your bridged interface. This will copy the MAC address from your physical eth0 interface, and will probably receive the same IP address from DHCP server. This setting is suitable for most Home Settings.

```
# dhcpcd br0
# ifconfig br0 up
```

   Alternatively, you can give static IP address to your bridge interface.

5. Last, but not least, make sure that all interfaces (eth+tap), that are members of bridge have their IPs removed. Only the bridge interface must have an IP address.

```
# ifconfig eth0 0.0.0.0
```

6. Now, go to VBox GUI, *VM > Settings > Network > Attached to: Host Interface > Interface name=tap0 > OK*

7. Congratulations ! You should have ping now, both to external world, your Host machine and your Guest machine.

# Advanced Topic: HOWTO USB + openSUSE 10.2 + VirtualBox 1.3.6

NOTE: This is an advanced topic, because openSUSE 10.2 lacks the needed kernel modules, which means that you have to rebuild your kernel to make USB work.

According to Pablo Sanchez (pablo at blueoakdb.com), (2.3.2007.): (Thanks him for his agreement to participate in LfL)

I was able to get USB working with openSUSE 10.2 - to be precise, someone else figured it out for VMWare and it applies for VirtualBox.

Many thanks to Alexey Eremenko for the hint on the kernel parameter which needed to be compiled.

The basic upshot is there's a security hole by doing the following so only do this on a secured machine - see https://bugzilla.novell.com/show_bug.cgi?id=210899

Slower bootup of VM:

I've noticed the VM (W2K) takes longer to boot up after this addition. On my Dell Insprion 8200 with a P4/1.6GHz chip, about an extra eight seconds. I didn't collect hard numbers and it doesn't concern me as it's only during boot up of the VM.

Preconditions:

VirtualBox must not be installed; uninstall it in order for it to 'see' the changes. You can install it before the kernel re-compilation or after.

```
# rpm –e VirtualBox
```

How to re-add USB support:

1. Install the following kernel packages:

   ```
   – kernel–source
   – kernel–syms
   ```

2. Recompile and install the openSUSE 10.2 stock kernel with:

   CONFIG_USB_DEVICEFS=y

3. Comment out the old 'usbfs' entry in /etc/fstab and replace it with:

   ```
   /dev/bus/usb   /proc/bus/usb   usbfs    defaults,devmode=666   0 0
   ```

   Note: devmode=666 will allow _anyone_ on your machine to access /dev/bus/usb; this is a security hole

Postconditions:

Re-install VirtualBox.

NOTE: you must use Proprietary version of VirtualBox, as the OSS-version lacks USB support.

# Troubleshooting and Tips

- To release your mouse or keyboard (to use on host computer), simply press right control key.
- Generally, I would not recommend installing GuestAdditions for Linux inside VM, as they are buggy.

  BUT if you are brave enough, and really want integration to work smoothly then: a) make sure you backup your virtual HDD, as there is no way to uninstall and going back. b) set Video RAM to 1MB as this will allow you to workaround the ultra-hi-resolution in X-Window - a known VirtualBox bug.
- For USB support, you must use proprietary version (available as freeware).

  According to Dmitriy (coldego at gmail dot com) from VirtualBox users group: in openSuSE 10.2 as host USB support will not work, because CONFIG_USB_DEVICEFS is no longer enabled, not even as a module. Perhaps you will need to upgrade your kernel (by manually compiling it).
- After changing user/groups permissions, restart your system.
- If you are stuck in Fullscreen mode, press Right “Ctrl+F”. Left control won't work, and this is done by design.
- If you encounter bugs, check the latest version. Fortunately, this product improves stability very quickly.
- Before you upgrade to any new version, it is recommended to uninstall the old one manually, by doing

  ```
  # sh ./VirtualBox_1.3.6_Linux_x86.run uninstall
  ```

  or for RPM version:

  ```
  # rpm –e VirtualBox
  ```

  Additionally, unload the driver:

  ```
  # rmmod vboxdrv
  ```

- Under some circumstances (usually after experimenting with Host-Networking), your default gateway might be gone from your Host routing table. To restore it manually, do:

```
# route  add -net 0.0.0.0 gw 192.168.0.1 dev br0
```

- If you still have trouble connecting via Host-Networking, make sure you're Firewall settings are not too restrictive. Check both Host and Guest configuration.

# Licensing

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- RDP Support
- USB-over-RDP Support
- iSCSI Technology
- Shared folders (available only via command-line)

# Thanks

Thanks goes to Thomas Schraitle (thomas.schraitle at suse.de) from Novell for giving me recommendations and tips for improving my writing style and teaching me Docbook XML.

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Thanks goes Pablo Sanchez (pablo at blueoakdb.com) from VirtualBox user community who contributed USB how-to section to this article.

Article first released on 12.Feb.2007 by me, Alexey Eremenko. This is version 8, updated on 07.Mar.2007.

# For More Information

VirtualBox Home Page: http://www.virtualbox.org

More complete technical information about emulation, virtualization and paravirtualization: http://www.virtualbox.org/wiki/Virtualization

VirtualBox Community Portal: http://virtualbox.org/wiki/Community

VirtualBox Supported Guest OSes: http://www.virtualbox.org/wiki/Guest_OSes

Toubleshooting User FAQ: http://www.virtualbox.org/wiki/User_FAQ

Another setup guide: http://www.howtoforge.com/virtualbox_fedora_centos_opensuse

Benchmark VirtualBox vs Qemu+KQemu vs VMware: http://www.linux-gamers.net/modules/smartsection/item.php?itemid=56

VirtualBox User Guide:  or simply do: Help->Contents from VirtualBox main app.

VirtualBox OSS: Alternatively, there are new community OSS RPMs available: http://software.opensuse.org/download/virtualization/ or the source code can be downloaded at: http://virtualbox.org/wiki/Downloads. Installing from sources is more headache.

The following link provides the crux of the USB solution: http://www.suseforums.net/index.php?showtopic=27788

VirtualBox direct download: (including GuestAdditions ISO) http://www.virtualbox.org/download/1.3.6/

Other useful links, that discuss UML utilities: http://user-mode-linux.sourceforge.net/dl-sf.html http://user-mode-linux.sourceforge.net/networking.html#daemons

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Version 1.2, November 2002



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