DAVIX

The Data Analysis and Visualization Linux®

Version 0.5.0

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1. **DAVIX - Visualize Your Logs!**

1.1. **Introduction**

Need help understanding gigabytes of logs? Your OS performance metrics do not make sense? You want to analyze your SAP user permissions? Then DAVIX, the live CD for visualizing IT data, is your answer!

DAVIX - the Data Analysis & Visualization Linux® - brings the most important free tools for data processing and visualization to your desk. There is no hassle with installing an operating system or struggle to build the necessary tools to get started with visualization. You can completely dedicate your time to data analysis.

The DAVIX CD is based on SLAX 6.0.x\(^1\) by Tomáš Matějíček and features broad out-of-the-box hardware support for graphic cards and network adapters. SLAX is based on Slackware and follows a modularized approach. Thus, the SLAX ISO image can easily be customized for various purposes. It can even be installed on USB sticks and provide you with mobile analysis capabilities.

The product is shipped with a comprehensive manual that gives you a quick start for all tools and provides information on how-to tailor DAVIX to your needs. All tools are accessible through the KDE start menu and accompanied with links to external manuals and tutorials. Therefore, all information to get started with the tools is available at a click of a button.

DAVIX is also part of Raffael's upcoming book *Applied Security Visualization* that will be published by Addison Wesley Professional\(^2\).

1.2. **Roadmap**

The first release of DAVIX is just the start. In the future, we would like establish DAVIX as the number one choice for log analysts. In particular we will improve following areas:

- More parser support for specific log formats,
- Data format converters for the visualization tools,
- More visualization tools,
- Support for distributed log processing,
- Integrated UI that will allow easy orchestration of the different tools.

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\(^1\) SLAX: [http://www.slax.org/](http://www.slax.org/)

2. Quick Start Guide

Starting to use DAVIX is as simple as counting from 1 to 4:

1. Download the ISO image,
2. Burn it onto a CD-ROM or DVD,
3. Boot the CD on your PC,
4. Analyze your data.

2.1. Download

The DAVIX ISO image can be downloaded from several locations around the world. Please select one of the mirrors closest to you. Since web browsers on occasion corrupt large downloads, we recommend using `wget` for downloading the ISO.

Main Server:
- Switzerland: [http://82.197.185.121/davix/release/davix-0.5.0.iso.gz](http://82.197.185.121/davix/release/davix-0.5.0.iso.gz)

Mirrors
- Germany: [http://bastard.codenomad.com/davix/davix-0.5.0.iso.gz](http://bastard.codenomad.com/davix/davix-0.5.0.iso.gz)
- United States: [http://depot.unixfoo.ch/davix/davix-0.5.0.iso.gz](http://depot.unixfoo.ch/davix/davix-0.5.0.iso.gz)
- United States: [http://www.noaccess.com/davix/davix-0.5.0.iso.gz](http://www.noaccess.com/davix/davix-0.5.0.iso.gz)
- United States: [http://www.geekceo.com/davix/davix-0.5.0.iso.gz](http://www.geekceo.com/davix/davix-0.5.0.iso.gz)

As a nice side effect of using `wget`, you can resume downloads by using the `-c` command line option when the connection got interrupted:

```
wget -c http://mirror.foo.bar/davix-0.5.0.iso.gz
```

After download check the size and the integrity of the ISO image. The MD5 hash and the file size are published on the DAVIX homepage.

---

3 For Win32 `wget` can found as part of the GNU utilities for Win32: [http://unxutils.sourceforge.net/](http://unxutils.sourceforge.net/)
4 The UNIX tool `md5sum` can be used to calculate the MD5 hash. The utility is also part of the GNU utilities for Win32.
2.2. **Burn**

Utilize any CD or DVD burning software of your liking and burn the ISO image on to a CD-ROM or DVD. The following screenshots show how to use *Nero Burning ROM* for this task.

- Open Nero Burning ROM from the Windows start menu.
- In the Windows menu choose *Recorder/Burn Image...* and select in the file dialog the ISO image you want to burn.

![](image1)

- Select the burn options and press the button *Burn.*

![](image2)

---

• When the burning progress dialog is shown, select the option *Verify written data*.

• The CD or DVD will now be burned. This can take a while to finish.
2.3. Boot

After CD creation reboot the computer. On some systems the BIOS is configured to boot directly from CD or DVD when a disk is located in the drive. On other systems it might be necessary to press a key during the BIOS boot screen for a displaying a boot menu, e.g. on a Dell Inspiron 6000 or Lenovo ThinkPad T60 you have to press \textit{F12}. If you do not like the default boot behavior you can change it in the BIOS setup menu.

When DAVIX starts a boot menu is displayed. Here you can select the boot option. In most cases the first option \textit{DAVIX Graphics mode (KDE)} will be the one to go for. It will take you directly to the KDE desktop.
2.4. Analyze

To find out what tools are available on DAVIX, take a look at the KDE start menu. The top four entries contain the modules provided by DAVIX. To simplify documentation access we have provided the links to the tool homepages and tutorials in the KDE start menu. Additionally, each tool menu offers direct access into DAVIX manual for a quick start example.

You can access the manual through the desktop shortcut:

Alternatively, you can access the manual chapter wise through the KDE start menu:
If you see a console symbol next to the tool it means that selecting the menu will cause a console to open and some form of help is shown. The tool itself is not executed. You will be required to do that yourself.

It is your turn now to find out what all these tools can do and start analyzing your logs. If you do not know what you can analyze or visualize, check the tool tutorials or get inspired by visiting secviz.org\(^7\). We have included usage examples for each of the tools in the chapter Tools - Showing You the Ropes.

### 2.5. What to Do Next?

The chapter Tools - Showing You the Ropes gives an overview of the most important tools found on the DAVIX CD as well as a quick start example for each tool.

If you are requiring information on an intermediate level, we recommend reading Raffael's book *Applied Security Visualization*\(^8\). A rough cuts version of the book is available on the Internet\(^9\). The book gives a very good introduction to visualization and introduces a use-case driven approach. It offers various case examples and shows you hands-on how to get from the log file to the visualization. Another good book on the topic is Greg Conti's book *Security Data Visualization*\(^10\). It shows you many samples on how security data can be visualized.

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\(^7\) SecViz - Security Visualization: [http://www.secviz.org/](http://www.secviz.org/)


Most likely you will stumble over a thing or two in DAVIX that you would like to tweak. Or some of your favorite tools are not included with DAVIX. Well then it is time to read the following chapters Customizing DAVIX ISO Image and Creating and Modifying Modules.
3. Tools - Showing You the Ropes

The important tools in DAVIX are organized in three categories depending on their use within the analysis process:

- Capture (C)
- Process (P)
- Visualize (V)

Some tools have the ability to cover several parts of the analysis process. In the following chapters the tool and its categories are noted in the chapter title.

All tools described in this manual are accessible through the system PATH. Therefore it is generally not required to know the install location. To run a tool open a console and then enter the first character of the tool's name and then press the *tabulator* key for auto completion.

```
root@slax:~# ru<TABULATOR>
ruby             rumint           run-with-aspell
rubyforge        run-parts        runlevel
```

The entry point binaries of most tools are installed in `/usr/local/bin`. For others see the section *important install locations* in the following tool chapters.
3.1. **AfterGlow (PV)**

**Purpose**
- Tool to convert CSV input to a DOT graph description. AfterGlow takes a configuration file that configures how the nodes and edges are represented in the DOT file. The DOT file can then be graphed via Graphviz.
- In addition to the main tool, AfterGlow ships a set of tools to convert CSV data into data formats that can be used with other visualization tools.

**Links**

**Important installation locations**
- `/usr/local/bin`
- `/usr/local/share/afterglow`

**Example**

1. Open a console.

2. First a CSV file of sniffed network traffic has to be generated using the command:
   
   ```
   tcpdump -vtnel eth0 | tcpdump2csv.pl "sip dip dport" > sniff.csv
   ```

3. Open Firefox and do some extended surfing.

4. Press `Ctrl-C` in the console window where `tcpdump` is running.

5. To transform the CSV file to a GraphViz dot file execute:
   
   ```
   cat sniff.csv | afterglow.pl > sniff.dot
   ```

6. To render the `sniff.dot` into a GIF file use the command:
   
   ```
   neato -Tpng -o sniff.png sniff.dot
   ```

---

- To view the result open GQview with command: `gqview`
3.2. ChartDirector (V)

Purpose

- Programming library to generate a wide variety of charts.

Links

- Homepage: http://www.advsofteng.com/

Important install locations

- /usr/lib/perl5/site_perl/5.8.8
- /usr/local/share/chartdirector

Example

- To generate a pie chart create a Perl script `test.pl` with the following contents:

```perl
#!/usr/bin/perl
use perlchartdir;
my $data = [10,20,25,10,5,40];
my $label = ["Dogs","Cats","Birds","Spiders","Rats","Mice"];
my $c = new PieChart(400, 300);
$c->setPieSize(200, 150, 75);
$c->setData($data, $label);
$c->makeChart("test.png");
```

- Then execute the script with the command: `perl test.pl`
- To view the result open GQview with the command: `gqview`
3.3. **Cytoscape (V)**

**Purpose**
- Generation and display of two-dimensional link graphs.

**Links**
- Tutorial: [http://cytoscape.org/cgi-bin/moin.cgi/Presentations](http://cytoscape.org/cgi-bin/moin.cgi/Presentations)

**Important install locations**
- /usr/local/bin
- /usr/local/lib/cytoscape
- /usr/local/share/cytoscape

**Example**
- Start *Cytoscape* through the KDE start menu.
- In the file open dialog navigate to: /usr/local/share/cytoscape/sampleData
- Open one of the graphs in this directory, e.g. *galFiltered.cys*
The data is then rendered.
3.4. EtherApe (V)

Purpose
- Real-time visualization of network traffic.

Links
- Homepage: http://etherape.sourceforge.net/

Important install locations
- /usr/local/bin
- /usr/local/etc/etherape
- /usr/local/share/etherape

Example
- Start EtherApe through the KDE start menu.
- EtherApe will go directly into monitoring mode.
- Open Firefox and generate some network traffic. EtherApe will then visualize your network connections.
3.5. GGobi (V)

Purpose

- Visualizes data with different graphs and allows brushing.

Links

- Homepage: http://www.ggobi.org/

Important install locations:

- /etc/xdg/ggobi
- /usr/local/bin
- /usr/local/share/ggobi

Example

- Start GGobi through the KDE start menu.
- In the file open dialog navigate to: /usr/local/share/ggobi/data
• Open one of the graphs in this directory, e.g. *Shipman.csv*

![Graphs](image)

• In the window menu select *Display\New Parallel Coordinate Display*.

• Activate the scatter plot window and the select *Interaction\Brush* in the main window menu.

• Now you can move the yellow box around in the scatter plot and see how the selection behaves in the other graph.
3.6. **glTail (V)**

**Purpose**
- Real-time visualization of web server traffic.

**Links**

**Important install locations**
- `/usr/bin/`
- `/usr/lib/ruby/gems/1.8/doc/gltail-0.0.7`

**Example**
- Execute the following command to generate a configuration file template:
  
  ```
  gl_tail --new foobar.yaml
  ```
  
  - Adjust the configuration file to your needs.

```yaml
servers:
  foobar:
    host: foobar.com
    port: 22
    user: foo
    password: topsecret
    command: tail -f -n0
    files: /var/log/apache/access_log
    parser: apache
    color: 0.2, 1.0, 0.2, 1.0
  
config:
  ...
```

- Execute the following command to start the visualization: `gl_tail foobar.yaml`
- Either wait for web server traffic or generate your own with Firefox.
3.7. GNUplot (V)

Purpose
- Generation of various types of charts. Mainly used for simple charting.

Links
- Homepage: http://www.gnuplot.info/
- Tutorial: http://t16web.lanl.gov/Kawano/gnuplot/intro/basic-e.html

Important install locations
- /usr/local/bin
- /usr/local/libexec/gnuplot
- /usr/local/share/gnuplot

Example
- Change to the following directory: cd /usr/local/share/gnuplot/demo/
- Execute the following command: gnuplot

```
root@slax:/usr/local/share/gnuplot/demo# gnuplot

G N U P L O T
Version 4.2 patchlevel 2
last modified 31 Aug 2007
System: Linux 2.6.24.4

Thomas Williams, Colin Kelley and many others

Type `help` to access the on-line reference manual.
The gnuplot FAQ is available from http://www.gnuplot.info/faq/

Send bug reports and suggestions to
<http://sourceforge.net/projects/gnuplot>

Terminal type set to 'x11'
```
- In the gnuplot command line enter: *load "all.dem"

```
gnuplot> load "all.dem"
******************** file simple.dem *******************
Hit return to continue
```

- You can step through the different examples by pressing *ENTER* in the gnuplot command line window. You can stop the interactive tour by pressing *Ctrl-C*.
3.8. Graphviz (V)

Purpose
- Generation of two-dimensional link graphs.

Links
- Homepage: http://www.graphviz.org/

Important install locations
- /usr/local/bin
- /usr/local/lib/graphviz
- /usr/local/share/graphviz

Example
- Generate a sample afterglow file with:
  `echo -e "a,b\nc,d\nc,e" | afterglow.pl > test.dot`
- Execute the following command to start the interactive mode of neato: `neato`
- Right click on the window and select *load graph*. 
- In the file open dialog navigate to *test.dot* and open it.

- Then the link graph is displayed.

- Try the other options in the right click menu, e.g. *birdseye* view.
3.9. GUESS (V)

Purpose
- Display and interaction with two-dimensional link graphs. Has a capability to use a scripting language to process graphs.

Links
- Homepage: http://graphexploration.cond.org/documentation.html
- Tutorial: http://guess.wikispot.org/Tutorial

Important install locations
- /usr/local/bin
- /usr/local/lib/guess/lib
- /usr/local/share/guess

Example
- Start GUESS through the KDE start menu.
- Click the button Load GDF/GraphML.

![Welcome to GUESS](image)

- In the file dialog click the browse button (the one with the three dots) and navigate to: /usr/local/share/guess/
- In the drop down list Files of Type select All Files.
- Open one of the graphs in this directory, e.g. sample.gdf.

- Acknowledge all the dialogs and wait for the graph to be loaded.
3.10. **InetVis (V)**

**Purpose**
- Real-time visualization of network traffic as a three-dimensional scatter plot.

**Links**
- Homepage [http://www.cs.ru.ac.za/research/g02v2468/inetvis.html](http://www.cs.ru.ac.za/research/g02v2468/inetvis.html)

**Important install locations**
- `/usr/local/bin`
- `/usr/local/share/inetvis`

**Example**
- Start *InetVis* through the KDE start menu.
- In the *InetVis Control Panel* select the menu *Mode\Monitor Local Host*. Due to a bug in the application you have to select the menu even when the flag is already set. Otherwise you will not be able to monitor live traffic.
Then open the browser and do some surfing in the Internet. In the 3D scatter plot window you will see dots appear.
3.11. Large Graph Layout - LGL (V)

Purpose
- Generation of two- and three-dimensional link graphs.

Links

Important install locations
- /usr/lib/perl5/site_perl/5.8.8
- /usr/local/bin
- /usr/local/etc
- /usr/local/lib/lg1
- /usr/local/share/lg1

Example 2D

- First a space separated file with the data has to be prepared:
  
  ```
  echo -e "a b
c d
c e
e d
b e" > test.ncol
  ```

- Then the graph can be generated using the following command:
  
  `lgl2d test.ncol`

```bash
root@slax:~# lgl2d test.ncol
LGLBREAKUP: /usr/local/bin/lglbreakup -d ./lgl/1210511733 ./lgl/test.lgl
Loading ./lgl/test.lgl...Done.
5 : Total Vertex Count
5 : Total Edge Count
Determining connected sets...
Found 1 connected sets.
Writing ./lgl/1210511733/0.lgl
5 : Vertex Count
5 : Edge Count
LGLAYOUT: /usr/local/bin/lglayout2D -o ./lgl/1210511733/0.coords -e -
        1 ./.lg1/12
10511733/0.lgl
Reading in Graph from ./lgl/1210511733/0.lgl...
Vertex Count: 5
Edge Count: 5
Outer radius is set to 2.23607
Initializing 5 particles...Done.
Initializing grid and placing particles...Done.
Initializing handlers...Done.
Generating Tree and checking for root.
Nodes Checked: 6
Root Node: e
There are 2 levels.
Initializing 1 thread(s)...Done.
Iteration: 303 Dx: 0.724267 Level: 2
Final Settle
Iteration: 455 Dx: 0.745508 Level: 2
LGLREBUILD: /usr/local/bin/lglrebuild -o ./lgl/final.coords -c ./lgl/coordFile
List
Total Total Connected Sets : 0
root@slax:~#```
To view the graph start \textit{LGL Viewer} through the KDE start menu.

In the window menu select \textit{File\Open .lgl file}.

From the directory where your \textit{test.ncol} is located navigate down to the subdirectory \textit{lgl} and select \textit{test.lgl}.

In the window menu select \textit{File\Open 2D Coords file}.

From the directory where your \textit{test.ncol} is located navigate down to the subdirectory \textit{lgl} and select \textit{final.coords}.

The graph should now be drawn.
To display the node ids press in the tool bar section the radio button *Show All IDs*. 
Example 3D

- First a space separated file with the data has to be prepared:
  \[ \text{echo -e "a b\n c d\n e\n f\n g" > test.ncol} \]

- Then the graph can be generated using the following command:
  \[ \text{lgl3d test.ncol} \]

\begin{verbatim}
root@slax:~# lgl3d test.ncol
LGLBREAKUP: /usr/local/bin/lglbreakup -d ./lgl/1210512148 ./lgl/test.lgl
Loading ./lgl/test.lgl...Done.
5 : Total Vertex Count
5 : Total Edge Count
Determining connected sets...
Found 1 connected sets.
Writing ./lgl/1210512148/0.lgl
5 : Vertex Count
5 : Edge Count
LGLAYOUT: /usr/local/bin/lglayout3D -o ./lgl/1210512148/0.coords -e -1 ./lgl/1210512148/0.lgl
Reading in Graph from ./lgl/1210512148/0.lgl...
Vertex Count: 5
Edge Count: 5
Outer radius is set to 1.70997
Initializing 5 particles...Done.
Initializing grid and placing particles...Done.
Initializing handlers...Done.
Generating Tree and checking for root.
Nodes Checked: 6
Root Node: e
There are 2 levels.
Initializing 1 thread(s)...Done.
Iteration: 303 Dx: 0.731679 Level: 2
Final Settle
Iteration: 455 Dx: 0.747695 Level: 2
- Done -
LGLREBUILD: /usr/local/bin/lglrebuild -o ./lgl/final.coords -c ./lgl/coordFileList
Total Total Connected Sets : 0
Current Connected Set : 1
\end{verbatim}

- To generate the VRML file use the following command:
  \[ \text{genVrml.pl lgl/test.lgl lgl/final.coords} \]

\begin{verbatim}
root@slax:~# genVrml.pl lgl/test.lgl lgl/final.coords
Loading coords...Done.
Generating node/text coordinates in VRML...Done.
Loading edges from file...Done.
Generating lines in VRML...Done.
Writing to lgl/final.coords.wrl...Done.
\end{verbatim}
To view the result start FreeWRL:
freewrl lgl/final.coords.wrl
3.12. Mondrian (V)

Purpose
- Generation and display of a variety of charts that are linked.

Links
- Homepage: http://rosuda.org/Mondrian/

Important install locations
- /usr/local/bin
- /usr/local/lib/mondrian
- /usr/local/share/mondrian

Example
- Start Mondrian through the KDE start menu.
- From the window menu select File/Open and open any one of the files found in the directory /usr/local/share/mondrian/, e.g. Pollen.txt.
• In the Mondrian main window select any columns you like.

• In the window menu select *Plot\Histogram*. Two histogram windows should appear.

• In the window menu select *Plot\Scatterplot*. A graph with a scatter plot should appear.

• You can now select a bar in the histogram and see how the selected data is represented in the other graphs.
3.13. MRTG (V)

Purpose

- Visualization of traffic load on network devices using SNMP queries.

Links

- Homepage: http://oss.oetiker.ch/mrtg/

Important install locations

- /usr/local/bin
- /usr/local/lib/mrtg2
- /usr/local/share/mrtg2

Example

- First you have to create a configuration file for your network device you want to monitor. In our example we have chosen 192.168.16.5.

```
cfgmaker --global 'WorkDir: /tmp' --global 'Options[[_]: bits,growright' --output /tmp/mrtg.cfg public@192.168.16.5
```

- To initialize the database we have to run the following mrtg command a couple of times. The error messages during the first two runs are normal.

```
mrtg /tmp/mrtg.cfg
mrtg /tmp/mrtg.cfg
mrtg /tmp/mrtg.cfg
```

- Create a cron job which calls mrtg every now and then using the command:

```
mrtg /tmp/mrtg.cfg
```
After a couple of runs open `file:///tmp/192.168.16.5_1.html` in Firefox to view the graph.

**Traffic Analysis for 1 -- DEIMOS1**

System: DEIMOS1 In
Maintainer:
Description: HP-ETHERNET-MULTI ENVIRONMENT_ROM-H.08.08, JETDIRECT-EX_JD34, EEPROM-H.08.49
iType: ethernetCsmacd (6)
dName: 
Max Speed: 10.0 Mbits/s
Ip: 192.168.16.5

The statistics were last updated **Sunday, 18 May 2008 at 3:02**, at which time 'DEIMOS1' had been up for **9:52:22**.

`Daily' Graph (5 Minute Average)

<table>
<thead>
<tr>
<th></th>
<th>Max</th>
<th>Average</th>
<th>Current</th>
</tr>
</thead>
<tbody>
<tr>
<td>In</td>
<td>8394.0 b/s</td>
<td>8394.0 b/s</td>
<td>8394.0 b/s</td>
</tr>
<tr>
<td>Out</td>
<td>208.0 b/s</td>
<td>208.0 b/s</td>
<td>208.0 b/s</td>
</tr>
</tbody>
</table>
3.14. NVisionIP (V)

Purpose
- Animated two-dimensional scatter plot of ARGUS files.

Links
- Homepage
  [http://security.ncsa.uiuc.edu/distribution/NVisionIPDownload.html](http://security.ncsa.uiuc.edu/distribution/NVisionIPDownload.html)
- Quick Start Guide
  [http://security.ncsa.uiuc.edu/distribution/NVisionIPDownload.html#Run](http://security.ncsa.uiuc.edu/distribution/NVisionIPDownload.html#Run)

Important install locations
- /usr/local/bin
- /usr/local/lib/NVisionIP
- /usr/local/share/NVisionIP

Example

- Start NVisionIP through the KDE start menu.
- In the window MultiDataSetChooser press the button Load.
- In the file open dialog navigate to: `~/usr/local/share/NVisionIP/samples`

- Open one of the file in this directory, e.g. `ArgusData_178_78`.

- In the window `MultiDataSetChooser` enter into the field `ClassB IP Header` the following value: `178.78`.

- Press the button `OK`.

- The data set is now loaded.
- Move the slider bar at the bottom of the window to advance the scatter plot across the time line.
3.15. Parvis (V)

Purpose
- Rendering of data as parallel coordinate display.

Links
- Homepage http://home.subnet.at/flo/mv/parvis/
- Introduction http://home.subnet.at/flo/mv/parvis/introduction.html

Important install locations
- /usr/local/bin
- /usr/local/lib/parvis
- /usr/local/share/parvis

Example
- Start Parvis through the KDE start menu.
- In the window menu select File/Open.
- In the file open dialog navigate to: /usr/local/share/parvis/data
- Open one of the graphs in this directory, e.g. voyager.stf.

![Open dialog](image)

- In the toolbar press the Brush button.
- Now you can select lines you want to inspect in more detail. When you select you do not select single lines. Instead you define an angle.
To make a new selection, press the *Reset All* button in the toolbar.
3.16. Ploticus (V)

Purpose
- Generation of all kinds of charts.

Links

Important install locations
- /usr/local/bin
- /usr/local/share/ploticus

Example
- Open a console.
- Create a file `data.csv` with following content:

```
Dogs,10
Cats,20
Birds,25
Spiders,10
Rats,5
Mice,40
```

- To generate a pie chart execute the command:

```
pl -prefab pie values=2 labels=1 data=data.csv delim=comma
```
3.17. **p0f (C)**

**Purpose**
- Identification of a remote host’s operating system.

**Links**
- Homepage [http://lcamtuf.coredump.cx/p0f.shtml](http://lcamtuf.coredump.cx/p0f.shtml)

**Important install locations**
- `/etc/p0f`
- `/usr/sbin`

**Example**
- Open a console.
- Execute command: `p0f`
- Open Firefox and surf to some site.
- The output of `p0f` reads as follows:

```
p0f - passive os fingerprinting utility, version 2.0.8
(C) M. Zalewski <lcamtuf@dione.cc>, W. Stearns <wstearns@pobox.com>
p0f: listening (SYN) on 'eth0', 262 sigs (14 generic, cksum 0F1F5CA2), rule: 'all'.
192.168.16.220:36390 - Linux 2.6 (newer, 2) (up: 4 hrs)
    -> 216.92.151.5:80 (distance 0, link: ethernet/modem)
192.168.16.220:35442 - Linux 2.6 (newer, 2) (up: 4 hrs)
    -> 216.92.177.115:80 (distance 0, link: ethernet/modem)
192.168.16.220:50819 - Linux 2.6 (newer, 2) (up: 4 hrs)
    -> 209.85.161.147:80 (distance 0, link: ethernet/modem)
...```
3.18. R Project (V)

Purpose

- Tool for statistical analysis that offers a great variety of graphing capabilities.

Links

- Homepage: http://www.r-project.org/
- Introduction: http://cran.r-project.org/doc/manuals/R-intro.html
- Manual: http://cran.r-project.org/manuals.html

Important install locations

- /usr/local/bin
- /usr/local/lib/R

Example

- Start **R Project** through the KDE start menu.

- After receiving the R command prompt you can start the demo by executing:

  ```
  demo(graphics())
  ```

- Step through the demo by pressing **ENTER**.
When you are back on the R command prompt you can start R Commander by executing the command: `library("Rcmdr")`

To load some sample data set select in the window menu `Data>Data in packages>Read data set from an attached package...`

Double click on the entry `datasets`.

To visualize select in the window menu `Graph> histogram...`
• In the *Histogram* configuration dialog select the variable you want to visualize, e.g. *height*, and then acknowledge the dialog.

![Histogram Dialog](image)

• The histogram is now plotted.

![Histogram Plot](image)
### 3.19. RRDtool (V)

**Purpose**
- A tool for graphing time series data.

**Links**
- Homepage: [http://oss.oetiker.ch/rrdtool/](http://oss.oetiker.ch/rrdtool/)

**Important install locations**
- `/usr/local/bin`
- `/usr/local/lib`
- `/usr/local/rrdtool-1.2.26`
- `/usr/local/share/rrdtool`

**Example**

- To set up the round robin database use the following command:

  ```
  rrdtool create test.rrd --start 920804400 DS:speed:COUNTER:600:U:U
  RRA:AVERAGE:0.5:1:24 RRA:AVERAGE:0.5:6:10
  ```

- To update the database with data use the following commands:

  ```
  rrdtool update test.rrd 920804700:12345 920805000:12357 920805300:12363
  rrdtool update test.rrd 920805600:12363 920805900:12363 920806200:12373
  rrdtool update test.rrd 920806500:12383 920806800:12393 920807100:12399
  rrdtool update test.rrd 920807400:12405 920807700:12411 920808000:12415
  rrdtool update test.rrd 920808300:12420 920808600:12422 920808900:12423
  ```

- The following command generates a PNG file with the graph:

  ```
  rrdtool graph speed.png --start 920804400 --end 920808000
  DEF:myspeed=test.rrd:speed:AVERAGE LINE2:myspeed#FF0000
  ```

- Open *GQview* and view image *speed.png*

---

3.20. RT Graph 3D (V)

Purpose

- Real-time 3D visualization of linked graphs.

Links

- Homepage http://www.secdev.org/projects/rtgraph3d/

Important install locations

- /usr/local/bin
- /usr/local/lib/rtgraph3d

Example

- Start *RT Graph 3D Server* through the KDE start menu.
- Wait until the window named RealTime Graph 3D appears.
- Start *RT Graph 3D Client* through the KDE start menu.
- On the RTG prompt of the client enter: `edge a b`

- The linked graph should now be shown.

- On the RTG prompt of the client enter: `help`
A list of possible commands is shown.
3.21. rumint (V)

Purpose
- Visualization of real-time and recorded network captures. Since rumint is running in Wine sniffing of real-time traffic is not supported.

Links
- Homepage http://www.rumint.org/

Important install locations
- ./root/.wine/drive_c/Program Files/rumint

Example
- Since rumint is running in Wine, it is not possible to capture live network traffic. Therefore you have to capture the traffic with Wireshark or tcpdump.
- Start rumint through the KDE start menu.
- In the window menu select File\Load PCAP Dataset.
- In the file open dialog navigate to your capture file and open it.
- In the window menu select View\Scatter Plot and then View\Parallel Plot.
• In the window *Scatter Plot* select *Source IP* in the X-axis and *Dest IP* in the Y-axis.

• In the window *Parallel Coordinate Plot* select *TCP Source Port* on the left hand side and *TCP Dest Port* on right hand side.

• Press the play button to start visualizing the network traffic.
3.22. Scapy (CPV)

Purpose
- Capture and manipulation of TCP/IP traffic.
- Visualization of traceroutes.

Links

Important install locations
- `/usr/lib/python2.5`
- `/usr/local/bin`

Example traceroute

- Open a console.
- Execute the command: `scapy`
- Execute the following command to traceroute a series of hosts:

  ```python
  res, unans = traceroute(['www.microsoft.com', 'www.cisco.com'],
  dport=[80, 443], maxttl=20, retry=-2)
  ```

```
root@slax:~# scapy
Welcome to Scapy (1.2.0.2)
>>> res, unans = traceroute(['www.microsoft.com', 'www.cisco.com'],... dport=[80, 443], maxttl=20, retry=-2)
Begin emission:**********************************************Finish
ed to send 80 packets.
******Begin emission: Finished to send 3 packets.
*Begin emission: Finished to send 2 packets.
Begin emission: Finished to send 2 packets.

Received 78 packets, got 78 answers, remaining 2 packets
198.133.219.25:tcp443 198.133.219.25:tcp80 207.46.19.190:tcp443
207.46.19.190:tcp80
1 192.168.16.1 11 192.168.16.1 11 192.168.16.1 11 192.168.16.1 11
192.168.16.1 11
2 212.254.136.1 11 212.254.136.1 11 212.254.136.1 11 212.254.136.1 11
212.254.136.1 11
...
```
- To plot the graph use the command: \texttt{res.graph()}

- To generate a three-dimensional plot use the command: \texttt{res.trace3D()}
Example Sniffing

- Open a console.
- Execute the command: `scapy`
- Sniff some network traffic: `p=sniff(count=50)`

```bash
root@slax:~# scapy
Welcome to Scapy (1.2.0.2)
>>> p=sniff(count=50)
```

- Plot some statistics using the command: `p.plot(lambda x:len(x))`

```python
>>> p.plot(lambda x:len(x))
<Gnuplot._Gnuplot.Gnuplot instance at 0x84cf0ec>
```

- The graph is plotted.
3.23. Shell Tools (P)

Purpose
- Common UNIX tools for processing text files.

Links
- Tutorial awk: http://www.grymoire.com/Unix/Awk.html

Important install locations
- /usr/bin

Example
- To extract the first column of a colon separated text file use:
  
  ```bash
  awk -F:\ '{print $1}' /etc/passwd
  ```

  ```
  root
  bin
  daemon
  adm
  lp
  ...
  ```

- To grep a single line from a text file use:
  ```bash
  grep "^root" /etc/passwd
  ```

  ```
  root:x:0:0::/root:/bin/bash
  ```

- To egrep lines for multiple patterns use:
  ```bash
  egrep "^root|^apache" /etc/passwd
  ```

  ```
  root:x:0:0::/root:/bin/bash
  apache:x:80:80:User for Apache:/srv/httpd:/bin/false
  ```
3.24. Shoki Packet Hustler (V)

Purpose
- Visualization of network traffic as a three-dimensional scatter plot.

Links
- Homepage: http://shoki.sourceforge.net/

Important install locations
- /usr/local/shoki

Example
- First you have to create a capture file with Wireshark.
- Next, Start Shoki Packet Hustler through the KDE start menu.
- In the file open dialog select the capture file.
The scatter plot of the network traffic is shown.
3.25. tcpdump (C)

Purpose
- Command line tool for sniffing network traffic.

Links
- Homepage: http://www.tcpdump.org/

Important install locations
- /usr/sbin

Example
- Open a console.
- To capture network traffic into a file from the network interface eth0, use the following command: tcpdump -s0 -i eth0 -w test.cap
3.26. Timesearcher 1 (V)

Purpose
- Analysis of time series data.

Links
- Homepage http://www.cs.umd.edu/hcil/timesearcher/

Important install locations
- /usr/local/bin
- /usr/local/lib/timesearcher1
- /usr/local/share/timesearcher1

Example
- Start Timesearcher 1 through the KDE start menu.
- In the file dialog click the browse button and navigate to: /usr/local/share/timesearcher1/data
- Open one of the graphs in this directory, e.g. 52weeks.tqd.
The graph is shown.
3.27.  tnv (V)

Purpose
- Time based analysis of network traffic.

Links
- Homepage  http://tnv.sourceforge.net/
- Tutorial  http://tnv.sourceforge.net/start.php

Important install locations
- /usr/local/bin
- /usr/local/lib/tnv
- /usr/local/share/tnv/

Example
- Start tnv through the KDE start menu.
- Acknowledge the startup dialog by pressing the button Begin using TNV.
- In the upcoming dialog set your local network IP range, in our example it is 192.168.16.0 with the network mask 255.255.255.0.

- In the Open Database Connection dialog select Embedded.
- In the window menu select *Capture\Capture Packets*...

- In the *Capture Packets* dialog select the network interface you want to monitor, e.g. *eth0*.

![Capture Packets dialog]

- Open Firefox and do some surfing.

- When you are done press the *Stop capture* button in tnv.

![Capturing Packets]

- The graph is rendered.

![Graph rendered]
3.28. Treemap (V)

Purpose
- Visualization of hierarchical data as treemaps.

Links
- Homepage: http://www.cs.umd.edu/hcil/treemap/

Important install locations
- /usr/local/bin
- /usr/local/lib/treemap
- /usr/local/share/treemap

Example
- Start TreeMap through the KDE start menu.
- The tool gives a license warning that it can only be used for non commercial purposes. If you agree to the license conditions press Agree, otherwise Exit.
- In the file open dialog navigate to: /usr/local/share/treemap/data.
- Open one of the graphs in this directory, e.g. election-with-hierarchy.tm3.
• The treemap is then rendered.

• By clicking into single boxes you can drill down the hierarchy.
3.29. Tulip (V)

Purpose
- Visualization tool for linked graphs that supports several layout algorithms.

Links
- Homepage http://www3.labri.fr/perso/auber/projects/tulip/

Important install locations
- /usr/local/bin
- /usr/local/lib
- /usr/local/lib/tlp
- /usr/local/share/tulip

Example
- Start Tulip through the KDE start menu.
- In the window menu select File\Import\Graphs\Uniform Random Binary Tree.
- In the dialog box enter for minsize 10 and for maxsize 100.
To layout the graph, use the window menu Algorithm\Layout\Tree\Bubble Tree.

Just acknowledge the upcoming dialog and the tree gets laid out.
3.30. Walrus (V)

Purpose
- Visualization hierarchical data as three-dimensional link graphs.

Links
- Homepage: http://www.caida.org/tools/visualization/walrus/

Important install locations
- /usr/local/bin
- /usr/local/lib/walrus
- /usr/local/share/walrus

Example
- Start Walrus through the KDE start menu.
- In the window menu select File/Open.
- In the file open dialog navigate to: /usr/local/share/walrus/samples
- Open one of the graphs in this directory, e.g. champagne.graph.
In the window menu select *Rendering\Start* to display the graph.
3.31. Wireshark (C)

Purpose
- Capturing and dissecting network traffic.

Links
- Homepage: http://www.wireshark.org/

Important install locations
- /usr/local/bin
- /usr/local/lib
- /usr/local/lib/wireshark
- /usr/local/share/wireshark

Example
- Start Wireshark through the KDE start menu.
- Select menu Capture\Options.
- In the field Interface select the network interface you want to sniff.
• Press the Start button.

• The network traffic is now recorded.

• To stop recording select the window menu Capture\Stop.

• In the center window frame you can now navigate through the dissected protocol layers.
4. Customizing DAVIX ISO Image

You will most likely get quickly to a point where you want to modify the DAVIX image to suite your particular requirements. Thanks to SLAX customizing your CD with your own configuration and adding or removing modules is really easy. This chapter shows you how to do that. Customizing can either be done under Linux or Windows.

4.1. Windows

The general steps for modifying the DAVIX ISO under Windows are the following:

- Create a new directory on your hard drive, e.g. `D:\mydavix\`
- Copy the `boot` and `slax` directory to the newly created directory.
- Make your changes according to the instructions in the following chapters.
- Open a DOS prompt.
- Navigate to the `slax` directory on your hard drive using the command: `cd /d D:\mydavix\slax\`
- Execute the following command to build the ISO image: `make_iso.bat d:\mydavix\mydavix.iso`

```
D:\mydavix\slax>make_iso.bat D:\mydavix\mydavix.iso
mkisofs 2.01 (i686-pc-cygwin)
  Scanning .
  Scanning ./boot
  Scanning ./boot/dos
  Scanning ./boot/isolinux
  Excluded by match: ./boot/isolinux/isolinux.boot
  Scanning ./boot/syslinux
  Scanning ./slax
  Scanning ./slax/base
  Scanning ./slax/devel
  Scanning ./slax/modules
  Scanning ./slax/optional
  Scanning ./slax/rootcopy
  ...
  Writing:   Initial Padblock                        Start Block 0
  Done with: Initial Padblock                        Block(s) 16
  Writing:   Primary Volume Descriptor               Start Block 16
  Done with: Primary Volume Descriptor               Block(s) 1
  Writing:   Eltorito Volume Descriptor              Start Block 17
Size of boot image is 4 sectors -> No emulation
  Done with: Eltorito Volume Descriptor              Block(s) 1
  Writing:   Joliet Volume Descriptor                Start Block 18
```
| Writing:   | Joliet Volume Descriptor       | Start Block | 18 |
| Done with: | Joliet Volume Descriptor       | Block(s)    | 1  |
| Writing:   | End Volume Descriptor          | Start Block | 19 |
| Done with: | End Volume Descriptor          | Block(s)    | 1  |
| Writing:   | Version block                  | Start Block | 20 |
| Done with: | Version block                  | Block(s)    | 1  |
| Writing:   | Path table                     | Start Block | 21 |
| Done with: | Path table                     | Block(s)    | 4  |
| Writing:   | Joliet path table              | Start Block | 25 |
| Done with: | Joliet path table              | Block(s)    | 4  |
| Writing:   | Directory tree                 | Start Block | 29 |
| Done with: | Directory tree                 | Block(s)    | 82 |
| Writing:   | Joliet directory tree          | Start Block | 111|
| Done with: | Joliet directory tree          | Block(s)    | 69 |
| Writing:   | Directory tree cleanup         | Start Block | 180|
| Done with: | Directory tree cleanup         | Block(s)    | 0  |
| Writing:   | Extension record               | Start Block | 180|
| Done with: | Extension record               | Block(s)    | 1  |
| Writing:   | The File(s)                    | Start Block | 181|

1.74% done, estimate finish Thu May 1 17:23:51 2008
...
99.16% done, estimate finish Thu May 1 17:23:34 2008

Total translation table size: 2048
Total rockridge attributes bytes: 48022
Total directory bytes: 166354
Path table size(bytes): 860

Done with: The File(s)       Block(s) 287089
Writing: Ending Padblock     Start Block 287270
Done with: Ending Padblock   Block(s) 150

Max brk space used 64000
287420 extents written (561 MB)

New ISO should be created now.
Press any key to continue . . .

- Either burn the created ISO image *mydavix.iso* to a CD-ROM/DVD or use any other deployment method as document in the chapter Deployment Options.

### 4.2. Linux

The general steps for modifying the DAVIX ISO under Linux are the following. Note that *hdc* is used here as a sample. On you system it could be on another device ID.

- Open a console.

- Insert DAVIX CD into your CD or DVD drive. On some Linux system the CD will automatically be mounted into `/mnt/hdc`.

- If DAVIX CD or DVD does not mount automatically you can mount it manually: `mount /dev/hdc /mnt/hdc`

- Create a new directory on your hard drive, e.g.: `mkdir -p /tmp/mydavix`

- Copy the `boot` and `slax` directory to the newly created directory: `cp -pvR /mnt/hdc/boot /mnt/hdc/slax /tmp/mydavix`

- Make your changes according to the instructions in the following chapters.
• Navigate to the slax directory on your hard drive using the command:
  \texttt{cd /tmp/mydavix/slax}

• Execute the following command to build the ISO image:
  \texttt{./make\_iso.sh /tmp/mydavix/mydavix.iso}

• Either burn the created ISO image \texttt{mydavix.iso} to a CD-ROM/DVD or use any other deployment method as document in the chapter Deployment Options.

4.3. Adding and Removing Modules

After copying all the SLAX files to the hard drive you can customize the SLAX content. Modules can be found in following directories:

• \texttt{slax\_base} SLAX core modules. Will be loaded on every boot.
• \texttt{slax\_modules} Standard modules. Will be loaded on every boot.
• \texttt{slax\_optional} Optional modules which can be specified in the boot menu.

You can add or remove modules from these directories as you like.

4.4. Overriding Files with \texttt{rootcopy}

If you just want to override a specific file in one of the modules you can use the \texttt{slax\_rootcopy} directory. The content of \texttt{rootcopy} will be applied to the union file system as the last step and it allows you to override any file in the file system.

This feature is very useful when you want to tweak single configuration files, like \texttt{/etc/X11/xorg.conf}. But for larger changes the use modules is encouraged.

4.5. Modifying Boot Menu

The boot menu can be modified through the file \texttt{slax.cfg}, which can be found in the \texttt{boot} directory. Here you can add or remove additional entries in the boot menu. To add a new one just append following section to the file:
Due to the width limitation in this document the line with the keyword `APPEND` is wrapped to form two lines. In your `slax.cfg` it needs to be on one line to work correctly.

The available boot options are documented in the chapter Boot Cheat Codes.

### 4.6. Boot Cheat Codes

SLAX comes along with many useful boot options which allow you to tweak boot and kernel behavior. The following list shows an extract of the most important ones. For a complete list check the SLAX boot parameter page.\(^\text{13}\)

- `nodma` Disable DMA for CD-ROM and hard drives.
- `noauto` Hard disk are not mounted automatically.
- `nohd` Hard disks are not mounted.
- `nocd` CD-ROMs are not mounted.
- `nosound` Disable sound.
- `password=foobar` Set root password to foobar.
- `password=ask` Ask for new password during boot.
- `changes=/dev/hdx` Stores changes to the specified device.
- `changes=/foo/bar` Stores changes to the specified directory.
- `changes=/foo.dat` Stores changes to the specified file.
- `toram` Copy all CD files to RAM
- `copy2ram` Same as `toram`
- `load=module` Loads the specified module from `slax\optional`.
- `noload=module` Disable loading of specified module
- `autoexec=xconf;kdm` After boot auto-configures X and starts KDM.

---

\(^{13}\) Boot Parameters in SLAX: [http://www.slax.org/documentation_boot_cheatcodes.php](http://www.slax.org/documentation_boot_cheatcodes.php)
5. Creating and Modifying Modules

This chapter shows you the different ways for getting your hands on additional SLAX modules for DAVIX.

5.1. Leverage Existing SLAX Modules

The easiest way to get a new SLAX module is by checking the SLAX website itself. The modules page offers a wide range of contributed ready to use SLAX modules\(^\text{14}\). These modules in general come with all the required libraries and should work right away.

![SLAX Modules](image)

There are currently 410 modules waiting to be checked...

5.2. Create New Modules from Slackware Packages

Another fast way to get additional modules is to search and download existing Slackware packages\(^\text{15}\) and convert them to SLAX modules using following command:

\[
tgz2lzm foo-bar-1.0.tgz foo-bar-1.0.lzm
\]

---

\(^{14}\) SLAX modules: [http://www.slax.org/modules.php](http://www.slax.org/modules.php)

\(^{15}\) Search Slackware Packages: [http://packages.slackware.it/](http://packages.slackware.it/)
This approach does no dependency checking and requires you to investigate the package dependencies yourself and convert all required packages to SLAX modules as well. The pragmatic approach is to convert the particular module you want to run and integrate it into the DAVIX ISO. Then you boot DAVIX and try to execute one of the binaries in your module. If there is an error that a specific library is missing then you have found an unsatisfied dependency. You then have to identify the Slackware package where the library can be found and convert it to a SLAX module. And then the testing starts again...

5.3. Customize Existing SLAX or DAVIX Modules

If you want to tweak a single SLAX or DAVIX package a just little. It is possible to extract a SLAX module using following command:

```
lzm2dir foo-bar-1.0.lzm /foo/bartarget/dir
```

You can then modify the extracted files to your needs and repack the directory to a SLAX module with following command:

```
dir2lzm /foo/bartarget/dir foo-bar-1.0.lzm
```
6. Deployment Options

The following instructions show you different ways how to install DAVIX on different types of media. The step-by-step guides are very generic and do also apply for other SLAX distributions.

6.1. VMware

DAVIX can be run inside VMware without any problems. Even OpenGL is supported.

The procedures were successfully tested with:

- VMware Workstation 6.0.3 Build 80004

6.1.1. Virtual Machine Setup

For all the described VMware deployments the following procedure is common to all:

- Start VMware Workstation.
- Through the Windows menu File\New...\Virtual Machine... start the New Virtual Machine Wizard.
- In the Virtual machine configuration step select Custom.
- In the Virtual machine hardware compatibility step select Workstation 6.
- As guest operating system select Linux and select Other Linux 2.6.x kernel.
- Choose virtual machine name and storage location.
- Choose One as the number of processors.
- Allocate at least 512 MB of memory. The optimal value is 1024 MB.
- Select Use bridged networking.
- Select I/O adapter type SCSI adapter LSI Logic.
- Select Create a new virtual disk.
- Select virtual disk type SCSI (Recommended).
• Choose disk size of 8 GB without allocating disk space.

• Choose disk file name and press Finish.

The basic virtual machine is now setup. Continue with one of the chapters CD-ROM based Boot or Installation on Virtual Hard Drive.

### 6.1.2. CD-ROM based Boot

Before continuing with this chapter please setup the basic virtual machine as described in chapter Virtual Machine Setup.

Edit virtual machine settings:

- Select tab **Hardware**
- Select **CD-ROM** drive.
- Select option **Use ISO image** and browse for the DAVIX image.
- Close the settings dialog.

On first startup the CD-ROM will not boot as default. Therefore following steps have to be taken:

- Start virtual machine.
- When the BIOS screen is shown press **F2**.
- Navigate to menu **Boot**.
- Move the entry **CD-ROM Drive** to the first position in boot order.
- Press F10 and confirm changes by selecting **Yes**.

### 6.1.3. Installation on Virtual Hard Drive

Before continuing with this chapter please setup the basic virtual machine as described in chapter Virtual Machine Setup.

Start the virtual machine and continue with the steps set out in chapter Hard Drive.
6.2. Other Virtualization Environments

Our testers have reported that DAVIX works with following other virtualization suites:

- Parallels 3.0 Build 5584
- QEMU 0.9
- VirtualBox 1.6.0
- VMware Fusion 1.1.2 Build 87978

For the exact environments, which the virtualization suites have been tested with, see chapter Virtual Machines.
6.3. **USB Stick**

It is possible to run DAVIX from a USB stick. This has the advantages that booting from stick in general is faster and it allows for changes to be made persistent. The following step-by-step instructions will help you to achieve this.

The procedures were successfully tested with following USB sticks:
- SanDisk Cruzer TITANIUM, 4GB
- SanDisk Cruzer Micro, 4 GB
- SONY Micro Vault, 1 GB
- Pretec 02GB Cha Cha, 2 GB

A word of warning:
- To avoid data loss the system should be shutdown properly before removing the USB stick. In particular the VFAT is quite prone to such abuse. If you want to have a robust solution use xfs as file system instead. For details see xfs instruction below.

6.3.1. **On Windows with VFAT Formatted USB Stick**

- First of all you have to get a USB stick currently a USB stick with at least 1 GB is recommended. If you have more it should work as well.

- If the USB is supports U3 it is necessary to uninstall the U3 feature using the tool provided by following web-site: [http://www.u3.com/uninstall/](http://www.u3.com/uninstall/).
- Then open the MMC console and add the *Disk Management* Snap-in.

- Format the USB stick partition with *FAT32* and the default *allocation unit size*. 
- Copy from the DAVIX CD/DVD the directories boot and slax to the USB stick.

- Writing to the flash memory will take a while. So grab a coffee. J

- Open the DOS prompt and navigate to the boot directory on the USB stick.

- Execute `bootinst.bat` and acknowledge the messages. The USB stick is now made bootable.

- Reboot your system and boot from USB stick. When you are seeing the DAVIX boot menu you are done!
6.3.2. On Linux with VFAT Formatted USB Stick

Although VFAT is supported by the SLAX kernel the `mkfs.vfat` is missing on the SLAX image. Therefore the first steps have to done in Windows.

- First of all you have to get a USB stick currently a USB stick with at least 1 GB is recommended. If you have more it should work as well.

- If the USB is supports U3 it is necessary to uninstall the U3 feature using the tool provided by following web-site: [http://www.u3.com/uninstall/](http://www.u3.com/uninstall/).

- Then open the MMC console and add the Disk Management Snap-in.

- Format the USB stick partition with FAT32 and the default allocation size.

- Leave the USB inserted in the computer.

- Boot DAVIX from CD-ROM.

- Open a console.

- The USB should have been mounted automatically to `/mnt/sda1`. Execute `mount` to cross-check.

```
root@slax:~# mount
aufs on / type aufs (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
usbfs on /proc/bus/usb type usbfs (rw)
/dev/sda1 on /mnt/sda1 type vfat
  (rw,noatime,quiet,umask=0,check=s,shortname=mixed)
root@slax:~# .
```

- Then copy the directories `boot` and `slax` to the USB stick.
  `cp -pvR /mnt/live/mnt/hdc/boot /mnt/live/mnt/hdc/slax /mnt/sda1`

- Writing to the flash memory will take a while. So grab a coffee.

- Change to the `boot` directory on the USB stick: `cd /mnt/sda1/boot`

- Execute `./bootinst.sh` and acknowledge the messages. The USB stick is now made bootable.

```
Welcome to Slax boot installer
This installer will setup disk /dev/sdal to boot only Slax.
Warning! Master boot record (MBR) of /dev/sda will be overwritten.
If you use /dev/sda to boot any existing operating system, it will not work
```

85 / 111
anymore. Only Slax will boot from this device. Be careful!

Press any key to continue, or Ctrl+C to abort...

Flushing filesystem buffers, this may take a while...
Setting up MBR on /dev/sda...
The Master Boot Record of /dev/sda has been updated.
Activating partition /dev/sda1...
No partition table modifications are needed.
Updating MBR on /dev/sda...
Setting up boot record for /dev/sda1...

**Disk /dev/sda1 should be bootable now. Installation finished.**

Read the information above and then press any key to exit...

- Reboot your system and boot from USB stick. When you are seeing the DAVIX boot menu you are done!

### 6.3.3. On Linux with xfs Formatted USB Stick

- First of all you have to get a USB stick currently a USB stick with at least 1 GB is recommended. If you have more it should work as well.

- If the USB is supports U3 it is necessary to uninstall the U3 feature using the tool provided by following web-site: [http://www.u3.com/uninstall/](http://www.u3.com/uninstall/).

- Leave the USB inserted in the computer.

- Boot DAVIX from CD-ROM in KDE mode.

- Open a console.

- To find out which device ID your hard disk has execute the command: `sfdisk --list`. For simplicity of this example `sda` has been chosen. Your device ID may be different. So watch out!

```
root@slax:~# sfdisk --list

Disk /dev/sda: 1019 cylinders, 127 heads, 62 sectors/track
Units = cylinders of 4031488 bytes, blocks of 1024 bytes, counting from 0

Device Boot Start     End       #cyls   #blocks   Id  System
/dev/sda1   *      0+    1018    1019-    4011772   83  Linux
/dev/sda2          0       -       0          0    0  Empty
/dev/sda3          0       -       0          0    0  Empty
/dev/sda4          0       -       0          0    0  Empty
```

- Use `mount` to make sure that all file systems on the USB stick are unmounted.

```
root@slax:~# mount
aufs on / type aufs (rw)
proc on /proc type proc (rw)
sysfs on /sys type sysfs (rw)
```
If there is still a file system (e.g. sda1) mounted then unmount it:

```
umount /dev/sda1
```

Wipe the USB stick to avoid later problems when installing the boot loader:

```
dd if=/dev/zero of=/dev/sda bs=1M
```

Then we have to partition the hard drive. Execute: `fdisk /dev/sda`

```
root@slax:~# fdisk /dev/sda
Device contains neither a valid DOS partition table, nor Sun, SGI or OSF disklabel
Building a new DOS disklabel with disk identifier 0x66b7eb5d.
Changes will remain in memory only, until you decide to write them.
After that, of course, the previous content won't be recoverable.
Warning: invalid flag 0x0000 of partition table 4 will be corrected by w(rite)
```

Create partition according to the options below:

```
Command (m for help): n
Command action
  e   extended
  p   primary partition (1-4)

P
Partition number (1-4): 1
First cylinder (1-1019, default 1): (ENTER)
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-1019, default 1019): (ENTER)
Using default value 1019
```

Activate the partition as bootable:

```
Command (m for help): a
Partition number (1-4): 1
```

Create xfs file system on first partition: `mkfs.xfs /dev/sda1`

Create a mount point for the third partition: `mkdir /mnt/sda1`
- Mount the third partition to the newly created mount point:
  
  `mount /dev/sda1 /mnt/sda1`

- Copy the `boot` and `slax` directory to the newly created directory:
  
  `cp -pvR /mnt/live/mnt/hdc/boot /mnt/live/mnt/hdc/slax /mnt/sda1`

- Writing to the flash memory will take a while. So grab a coffee. J

- Change to the `boot` directory on the USB stick: `cd /mnt/sda1/boot`

- Execute `./liloinst.sh` and acknowledge the messages. The USB stick is now made bootable.

---
Welcome to Slax boot installer
---

This installer will setup disk /dev/sda to boot only Slax from /dev/sda1. Warning! Master boot record (MBR) of /dev/sda will be overwritten. If you use /dev/sda to boot any existing operating system, it will not work anymore. Only Slax will boot from this device. Be careful!

Press any key to continue, or Ctrl+C to abort...

---

Flushing filesystem buffers, this may take a while...  
Updating MBR to setup boot record...  
Warning: /dev/sda is not on the first disk  
Warning: The initial RAM disk is too big to fit between the kernel and the 15M-16M memory hole. It will be loaded in the highest memory as though the configuration file specified "large-memory" and it will be assumed that the BIOS supports memory moves above 16M.  
Added Slax ? *  
Disk /dev/sda should be bootable now. Installation finished.  

Read the information above and then press any key to exit...

- Reboot your system and boot from USB stick. When you are seeing the DAVIX boot menu you are done!
6.4. Hard Drive

DAVIX can also be installed on hard disk where all SLAX modules have been extracted. These instructions are based in parts on the paper published by Offensive Security.\footnote{BackTrack Hard Drive Installation: \url{http://www.offensive-security.com/documentation/backtrack-hd-install.pdf}}.

A word of warning:

- According to BackTrack the BackTrack Installer is experimental and has not yet been tested! It is therefore highly recommended to work with an empty hard drive or use VMware.

Here is the procedure for installing DAVIX on hard disk:

- Boot DAVIX from CD or DVD in KDE mode. Make sure there are no other hard drive devices attached than the one you want DAVIX onto.

- To find out which device ID your hard disk has execute the command: `sfdisk -list`. For simplicity of this example `hda` has been chosen. Your device ID may be different. So watch out!

```
root@slax:~# sfdisk --list
```

<table>
<thead>
<tr>
<th>Device</th>
<th>Boot</th>
<th>Start</th>
<th>End</th>
<th>#cyls</th>
<th>#blocks</th>
<th>Id</th>
<th>System</th>
</tr>
</thead>
<tbody>
<tr>
<td>/dev/hda1</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Empty</td>
</tr>
<tr>
<td>/dev/hda2</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Empty</td>
</tr>
<tr>
<td>/dev/hda3</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Empty</td>
</tr>
<tr>
<td>/dev/hda4</td>
<td>0</td>
<td>-</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>Empty</td>
</tr>
</tbody>
</table>

- First we have to partition the hard drive. Execute: `fdisk /dev/hda`

```
root@slax:~# fdisk /dev/hda
```

The number of cylinders for this disk is set to 9733.
There is nothing wrong with that, but this is larger than 1024, and could in certain setups cause problems with:
1) software that runs at boot time (e.g., old versions of LILO) 
2) booting and partitioning software from other OSs (e.g., DOS FDISK, OS/2 FDISK)

- Create first partition according to the options below:

```
Command (m for help): n
Command action
   e   extended
   p   primary partition (1-4)
P
Partition number (1-4): 1
First cylinder (1-9733, default 1): (ENTER)
```
Using default value 1
Last cylinder or +size or +sizeM or +sizeK (1-9733, default 9733): +50M

- Create second partition according to the options below:

Command (m for help): n
Command action
  e extended
  p primary partition (1-4)
P
Partition number (1-4): 2
First cylinder (8-9733, default 8): (ENTER)
Using default value 8
Last cylinder or +size or +sizeM or +sizeK (8-9733, default 9733): +512M

- Create third partition according to the options below:

Command (m for help): n
Command action
  e extended
  p primary partition (1-4)
P
Partition number (1-4): 3
First cylinder (71-9733, default 71): (ENTER)
Using default value 71
Last cylinder or +size or +sizeM or +sizeK (71-9733, default 9733): (ENTER)
Using default value 9733

- Activate the first partition as bootable:

Command (m for help): a
Partition number (1-4): 1

- Change the partition type of partition #2 to 82 for Linux Swap:

Command (m for help): t
Partition number (1-4): 2
Hex code (type L to list codes): 82
Changed system type of partition 2 to 82 (Linux swap)

- Now we have to write the partition table to disk:

Command (m for help): w
The partition table has been altered!
Calling ioctl() to re-read partition table.
Syncing disks.
root@slax:~#

- Now we have to initialize the swap partition: mkswap /dev/hda2

root@slax:~# mkswap /dev/hda2
• Create ext3 file system on first partition: `mkfs.ext3 /dev/hda1`

```
root@slax:~# mkfs.ext3 /dev/hda1
mke2fs 1.40.8 (13-Mar-2008)
Filesystem label=
OS type: Linux
Block size=1024 (log=0)
Fragment size=1024 (log=0)
14056 inodes, 56196 blocks
2809 blocks (5.00%) reserved for the super user
First data block=1
Maximum filesystem blocks=57671680
7 block groups
8192 blocks per group, 8192 fragments per group
2008 inodes per group
Superblock backups stored on blocks:
 8193, 24577, 40961
Writing inode tables: done
Creating journal (4096 blocks): done
Writing superblocks and filesystem accounting information: done
This filesystem will be automatically checked every 24 mounts or
180 days, whichever comes first. Use tune2fs -c or -i to override.
```

• Create ext3 file system on third partition: `mkfs.ext3 /dev/hda3`

```
root@slax:~# mkfs.ext3 /dev/hda3
mke2fs 1.40.8 (13-Mar-2008)
Warning: 256-byte inodes not usable on older systems
Filesystem label=
OS type: Linux
Block size=4096 (log=2)
Fragment size=4096 (log=2)
4857856 inodes, 19404511 blocks
970225 blocks (5.00%) reserved for the super user
First data block=0
Maximum filesystem blocks=0
593 block groups
32768 blocks per group, 32768 fragments per group
8192 inodes per group
Superblock backups stored on blocks:
  32768, 98304, 163840, 229376, 294912, 819200, 884736, 1605632, 2654208,
  4096000, 7962624, 11239424
Writing inode tables: done
Creating journal (32768 blocks): done
Writing superblocks and filesystem accounting information: done
This filesystem will be automatically checked every 23 mounts or
180 days, whichever comes first. Use tune2fs -c or -i to override.
```

• Create a mount point for the third partition: `mkdir /mnt/hda3`

• Mount the third partition to the newly created mount point:
  `mount /dev/hda3 /mnt/hda3`
• In the KDE start menu System select BackTrack Installer (Experimental).

• Configure BT Installer as follows:

<table>
<thead>
<tr>
<th>Source (BackTrack CD):</th>
<th>/mnt/live/mnt/sda1/slax</th>
</tr>
</thead>
<tbody>
<tr>
<td>Install BackTrack to:</td>
<td>/mnt/hda3</td>
</tr>
<tr>
<td>Write New MBR (lilo.mbr) to:</td>
<td>/dev/hda</td>
</tr>
<tr>
<td>Installation method:</td>
<td>Real</td>
</tr>
<tr>
<td>Restore Original MBR after lilo</td>
<td>unchecked</td>
</tr>
</tbody>
</table>

• Press the Install button.

• Installing DAVIX on hard drive will take a while. So grab a coffee. J

• Press the Close button.

• Shutdown DAVIX.

• Remove install media, like CD or USB stick.

• Boot your system. When you are seeing the DAVIX boot menu you are done!
7. Hardware

SLAX and therewith DAVIX runs on normal PCs as well as in virtual machines. This chapter show which environments are known to work with DAVIX and which ones not.

7.1. Physical Machines

7.1.1. Hardware Known to Work

In general DAVIX should work on any Intel and AMD based architecture. Following hardware is known to work with DAVIX:

<table>
<thead>
<tr>
<th>PC Brand &amp; Type</th>
<th>Dell Dimension 3100c</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Type</td>
<td>Intel P4 Celeron</td>
</tr>
<tr>
<td>Memory</td>
<td>-</td>
</tr>
<tr>
<td>Graphic Card</td>
<td>-</td>
</tr>
<tr>
<td>LAN Network Card</td>
<td>-</td>
</tr>
<tr>
<td>Wireless Network Chipset</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PC Brand &amp; Type</th>
<th>Dell Inspiron 6000</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Type</td>
<td>Intel Pentium M, 1.86 GHz</td>
</tr>
<tr>
<td>Memory</td>
<td>1 GB</td>
</tr>
<tr>
<td>Graphic Card</td>
<td>ATI Mobility Radeon X300</td>
</tr>
<tr>
<td>LAN Network Card</td>
<td>Broadcom 440x 10/100</td>
</tr>
<tr>
<td>Wireless Network Chipset</td>
<td>Intel PRO/Wireless 2200BG</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PC Brand &amp; Type</th>
<th>Lenovo ThinkPad T60</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Type</td>
<td>T2400, 1.83 GHz</td>
</tr>
<tr>
<td>Memory</td>
<td>1 GB</td>
</tr>
<tr>
<td>Graphic Card</td>
<td>ATI Mobility Radeon X1400</td>
</tr>
<tr>
<td>LAN Network Card</td>
<td>Intel PRO/1000 PL</td>
</tr>
<tr>
<td>Wireless Network Chipset</td>
<td>Intel PRO/Wireless 3945ABG</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PC Brand &amp; Type</th>
<th>HP nx7400</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Type</td>
<td>Intel Centrino Duo</td>
</tr>
<tr>
<td>Memory</td>
<td>-</td>
</tr>
<tr>
<td>Graphic Card</td>
<td>-</td>
</tr>
<tr>
<td>LAN Network Card</td>
<td>-</td>
</tr>
<tr>
<td>Wireless Network Chipset</td>
<td>-</td>
</tr>
<tr>
<td>PC Brand &amp; Type</td>
<td>HP nc6320</td>
</tr>
<tr>
<td>-------------------------------------</td>
<td>-----------------</td>
</tr>
<tr>
<td>CPU Type</td>
<td>Intel Centrino Duo</td>
</tr>
<tr>
<td>Memory</td>
<td>-</td>
</tr>
<tr>
<td>Graphic Card</td>
<td>-</td>
</tr>
<tr>
<td>LAN Network Card</td>
<td>-</td>
</tr>
<tr>
<td>Wireless Network Chipset</td>
<td>-</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PC Brand &amp; Type</th>
<th>Shuttle SK22G2</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Type</td>
<td>Dual Core AMD 2500</td>
</tr>
<tr>
<td>Memory</td>
<td>1 GB</td>
</tr>
<tr>
<td>Graphic Card</td>
<td>NVIDIA GeForce 7300 LE</td>
</tr>
<tr>
<td>LAN Network Card</td>
<td>VIA Compatible Fast Ethernet Adapter</td>
</tr>
<tr>
<td>Wireless Network Chipset</td>
<td>Intel PRO/Wireless 2200BG</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PC Brand &amp; Type</th>
<th>Custom built PC</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Type</td>
<td>Intel Core 2 6600 Dual Core, 2.4 GHz</td>
</tr>
<tr>
<td>Memory</td>
<td>2 GB</td>
</tr>
<tr>
<td>Graphic Card</td>
<td>NVIDIA 7950 GT</td>
</tr>
<tr>
<td>LAN Network Card</td>
<td>Marvel Yukon 88E8056 / Gigabit</td>
</tr>
<tr>
<td>Wireless Network Chipset</td>
<td>No wireless adapter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PC Brand &amp; Type</th>
<th>Custom built PC based on Gigabyte GA-K8NF-9 motherboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Type</td>
<td>AMD Athlon 64 X2 Dual Core Processor 4400+, 2.21 GHz</td>
</tr>
<tr>
<td>Memory</td>
<td>2 GB</td>
</tr>
<tr>
<td>Graphic Card</td>
<td>Matrox Millennium P650 PCIe 128</td>
</tr>
<tr>
<td>LAN Network Card</td>
<td>NVIDIA nForce Networking Controller</td>
</tr>
<tr>
<td>Wireless Network Chipset</td>
<td>No wireless adapter</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PC Brand &amp; Type</th>
<th>Custom built PC based on Gigabyte GA-K8NF-9 motherboard</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Type</td>
<td>AMD Athlon 64 X2 Dual Core Processor 4400+, 2.21 GHz</td>
</tr>
<tr>
<td>Memory</td>
<td>2 GB</td>
</tr>
<tr>
<td>Graphic Card</td>
<td>NVIDIA GeForce 6500</td>
</tr>
<tr>
<td>LAN Network Card</td>
<td>NVIDIA nForce Networking Controller</td>
</tr>
<tr>
<td>Wireless Network Chipset</td>
<td>No wireless adapter</td>
</tr>
</tbody>
</table>
7.1.2. Incompatible Hardware

The hardware listed here is known to have problems.

<table>
<thead>
<tr>
<th>PC Brand &amp; Type</th>
<th>Dell Dimension E521</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Type</td>
<td>AMD</td>
</tr>
<tr>
<td>Memory</td>
<td>-</td>
</tr>
<tr>
<td>Graphic Card</td>
<td>-</td>
</tr>
<tr>
<td>LAN Network Card</td>
<td>-</td>
</tr>
<tr>
<td>Wireless Network Chipset</td>
<td>-</td>
</tr>
<tr>
<td>Issue</td>
<td>Graphic card and USB not detected.</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>PC Brand &amp; Type</th>
<th>Lenovo 3000 n200</th>
</tr>
</thead>
<tbody>
<tr>
<td>CPU Type</td>
<td>Intel® Core 2 Duo</td>
</tr>
<tr>
<td>Memory</td>
<td>-</td>
</tr>
<tr>
<td>Graphic Card</td>
<td>NVIDIA GeForce Go 7300 with Turbo Cache</td>
</tr>
<tr>
<td>LAN Network Card</td>
<td>-</td>
</tr>
<tr>
<td>Wireless Network Chipset</td>
<td>-</td>
</tr>
<tr>
<td>Issue</td>
<td>Under KDE the start menu does not show text and icons.</td>
</tr>
</tbody>
</table>
### 7.2. Virtual Machines

DAVIX runs as guest operating system on several different virtualization platforms. Following configurations are known to work:

<table>
<thead>
<tr>
<th>Host OS</th>
<th>Virtualization Software</th>
<th>Guest OS Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>Windows XP SP2</td>
<td>VMware Workstation 6.0.3 Build 80004</td>
<td>Other Linux 2.6 Kernel</td>
</tr>
<tr>
<td>Ubuntu (Gutsy/Herdy)</td>
<td>VMware Server 1.0.4 Build 56528</td>
<td>Other Linux 2.6 Kernel</td>
</tr>
<tr>
<td>Ubuntu (Gutsy/Herdy)</td>
<td>Virtualbox 1.5.6</td>
<td>Other Linux 2.6 Kernel</td>
</tr>
<tr>
<td>Ubuntu (Gutsy/Herdy)</td>
<td>Qemu 0.9.0</td>
<td>Other Linux 2.6 Kernel</td>
</tr>
<tr>
<td>FreeBSD 7.0 Stable</td>
<td>Qemu 0.9.1</td>
<td>Other Linux 2.6 Kernel</td>
</tr>
<tr>
<td>Mac OS 10.5.2</td>
<td>Parallels 3.0 Build 5584</td>
<td>Other Linux</td>
</tr>
<tr>
<td>Mac OS 10.5.2</td>
<td>VirtualBox 1.5.51</td>
<td>Linux 2.6</td>
</tr>
<tr>
<td>Mac OS 10.5.2</td>
<td>VirtualBox 1.6.0</td>
<td>Linux 2.6</td>
</tr>
<tr>
<td>Mac OS 10.5.3</td>
<td>VMware Fusion 1.1.2 Build 87978</td>
<td>Other Linux 2.6 Kernel</td>
</tr>
</tbody>
</table>
8. Networking

8.1. LAN networking

Wired LAN with DHCP should work out of the box on most systems. In some cases, e.g. under VMware, it can sometimes happen that the interface eth0 is not up after booting. The following procedure shows you how to troubleshoot connectivity problems. For simplicity reasons the example shown here are based on the network interface ID `eth0`. For your particular system it can be different.

- First check if your network cable is attached and if the LEDs on your network card or switch port are turn on.
- See if `eth0` is listed: `ifconfig`  
- If in the resulting list `eth0` is missing then try to start up the interface: `ifconfig eth0 up`  
- Check again if `eth0` is up: `ifconfig`  
- When the interface is showing up you can start the DHCP agent: `dhcpcd eth0`  
- Check if a dynamic IP address was assigned: `ifconfig`  
- If there no IP address was assigned, repeat the previous four steps.

8.2. Wireless Networking

8.2.1. Kernel Supported Drivers

Since not every wireless card has open source drivers, setting up wireless LAN can be difficult. But the first thing is to try if any the kernel supported drivers work. For simplicity reasons the example shown here are based on the network interface ID `eth0`. For your particular system it can be different, e.g. it can be `wlan0` or `ath0`.

- First make sure that wireless is enabled in your BIOS and activated. On some systems, like the Lenovo ThinkPad T60, it is required to turn on wireless by moving the switch located on the outside of you notebook into the On position. On others you can use a keyboard function shortcut to enable wireless, e.g. on a Dell Inspiron it is `Fn-F2`.  
- Boot DAVIX in KDE mode and open a console.
• Then check if a wireless interface is available: `iwconfig`

```bash
root@slax:~# iwconfig
lo    no wireless extensions.
eth0  unassociated  ESSID:off/any
      Mode:Managed  Channel=0  Access Point: Not-Associated
      Bit Rate:0 kb/s  Tx-Power=20 dBm  Sensitivity=-8/0
      Retry limit:7  RTS thr:off  Fragment thr:off
      Encryption key:off
      Power Management:off
      Link Quality:0  Signal level:0  Noise level:0
      Rx invalid nwid:0  Rx invalid crypt:0  Rx invalid frag:0
      Tx excessive retries:0  Invalid misc:218  Missed beacon:0

eth1  no wireless extensions.
```

• Before being able to scan you have to startup the wireless device with the command: `ifconfig eth0 up`

• Then you can scan for wireless LANs using: `iwlist eth0 scan`

• After a while a list of available Wireless access points will be visible. If you favorite on is missing redo the scan.

```bash
root@slax:~# iwlist eth0 scan
eth0  Scan completed :
      Cell 04 - Address: 00:DE:AD:BE:EF:00
      ESSID:"xxx"
      Protocol:IEEE 802.11b
      Mode:Master
      Frequency:2.412 GHz (Channel 1)
      Encryption key:off
      Bit Rates:1 Mb/s; 2 Mb/s; 5.5 Mb/s; 11 Mb/s
      Quality=83/100  Signal level=-83 dBm
      Extra: Last beacon: 184ms ago
```

8.2.2. NDISwrapper

If the steps in the previous chapters do not work out for you, you can try to get wireless running with the NDIS Drivers. DAVIX supports the `ndiswrapper`, which allows you using the Windows NDIS Drivers.

For details on your particular wireless card see NDISwrapper home page\(^\text{17}\) and other third party websites.

Known issues:

- Not all vendor drivers support the promiscuous mode in their wireless drivers. It can therefore be that sniffing network traffic of other system on the network is not possible.

9. **Graphic Cards**

9.1. **OpenGL**

The underlying SLAX distribution supports many graphic cards. Thus, DAVIX should work in most systems. There is one big limitation: OpenGL runs in simulation mode only. This can lead to situation, that applications that heavily rely on OpenGL, e.g. like GoogleEarth, behave really slowly. But for most visualization tools found on DAVIX there should not be any problems to expected.

If you want to have better performance you have to install the vendor supported graphic card drivers. Check the vendor web sites for details\(^\text{18}\):

<table>
<thead>
<tr>
<th>Vendor</th>
<th>Website</th>
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<tr>
<td>3DLabs</td>
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<td><a href="http://www.sis.com/support/support_prodid.htm">http://www.sis.com/support/support_prodid.htm</a></td>
</tr>
</tbody>
</table>

Since these vendor drivers have very stringent licensing conditions it is not possible to distribute them with DAVIX.

9.2. **Multi-Head Support**

If you want to run DAVIX with two or more screens it is most of the time required to use the vendor supplied graphic card driver. For vendor web sites see the URL list in chapter OpenGL.

For configuration hints check the *README* and *INSTALL* files coming along the vendor driver packages.

---

\(^\text{18}\) List taken from GoogleEarth Help: [http://earth.google.com/support/bin/answer.py?answer=21462](http://earth.google.com/support/bin/answer.py?answer=21462)
10. **FAQ**

Q: What does DAVIX stand for?
A: DAVIX is an abbreviation for "Data Analysis and Visualization LinuX®".

Q: Which Linux distribution is DAVIX based on?
A: DAVIX utilizes the SLAX 6.0.x as a base.

Q: Which OS did you use as a build system for your modules?
A: A full installation of Slackware 12.0 and dropline Gnome 2.20.0 was used for compiling applications from source code. Several DAVIX packages have been directly taken from the Slackware distribution and have been converted with tgz2lzm to SLAX packages.

Q: What is the difference between DAVIX and BackTrack:
A: BackTrack is very focused on penetration testing. Although several tools can be found in both distributions, DAVIX concentrates on the aspects of data mining and visualization.

Q: How can I provide a download mirror for DAVIX?
A: Create a cron job with following command and report the HTTP or FTP download URL to us: jan.monsch ät iplosion.com

```
rsync -av 82.197.185.121::davix /to/wherever/it/goes/on/your/sever
```

Q: Where can I report a bug or a feature request?
A: We utilize Google Code for bug tracking. To report a bug you are required to create a Google account. Our project URL is: http://code.google.com/p/davix/

Q: Can I build DAVIX from ground up?
A: Currently, the build scripts do not allow automated building of the CD. Therefore we refrain from publishing the scripts. When we have fixed the build environment we will certainly publish the build scripts.
11. Acknowledgements

We would like to thank all people who have contributed to DAVIX in one form or another. Without them DAVIX would not have been possible. Thank you!

In particular we would like to thank Gabriel Mueller for his regression testing efforts, which tremendously help improving lots of details on the CD as well as in the manual.

A very big thanks to Greg Conti for his encouraging feedback, which showed us, that we are on the right track. Above all Greg and John Goodall have given us a platform at the vizSEC 2008 conference in Boston\textsuperscript{19} for presenting DAVIX to the research community. We feel very honored and thank you both for this.

Beta-Testers for DAVIX:
\begin{itemize}
\item Greg Conti
\item Eric Deschamps
\item Benjamin Kohler
\item C. S. Lee (geek00L)
\item Kevin Liston
\item mOODy
\item Gabriel Mueller
\item Jose M. Pavón (chmeee)
\end{itemize}

Mirror & Bandwidth Providers:
\begin{itemize}
\item Kord Campbell
\item Benjamin Kohler
\item Martin Winter
\end{itemize}

A special thanks to Ben Shneiderman from the University of Maryland Human-Computer Interaction Lab for allowing us to integrate Treemap and Timesearcher 1 in DAVIX.

\textsuperscript{19}vizSEC: \url{http://www.vizsec.org/}
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