

# **AIT STARCD: a GIS/RS livecd for educational purposes**

Yann Chemin

\* STAR program, Asian Institute of Technology, 58 Moo 9, Km. 42, Paholyothin Highway, Klong Luang, Pathum Thani 12120, Thailand, tel. +6625160110, fax +6625162126, e-mail [yann.chemin@ait.ac.th](mailto:yann.chemin@ait.ac.th)

## **1 Introduction**

The recent developments in the desktop environment for Linux provide a certain easiness to use that can be made to good use in providing a first hand experience to students in Universities. Especially in the field of Geographical Information Systems and remote sensing sciences, the open source community has a long lasting software: GRASS GIS and quite a few young projects aiming at providing Free and Open Source GIS experiences.

Recently, [1] started a project called `mklivecd`, that can be summarized as “ [...] *a collection of scripts that allows you to generate a livecd (<http://livecd.berlios.de>), ala Knoppix, from an existing Mandrake Linux 9.2+ installation.* ”

As an educational Institution, the Asian Institute of Technology (AIT) has to provide experience to its students in order to prepare them for professional and research careers. The Space Technology Applications and Research (STAR) program has generally a set of commercial software to build student experience over several specialized subject within the GIS and remote sensing sciences. Since those software are installed and run from a different operating system than the one where FOSS software generally operate, it was a logical step to develop a non-intrusive Laboratory CDRom that would permit a full fledged Linux system to be run from RAM, with GIS/RS software, datasets and tutorials/handouts.

## **2 Purpose**

This CD is made with the intention to make things easier for the students to concentrate on using the GIS techniques in GRASS GIS and discover Quantum GIS.

## **3 Tools and Materials**

`mklivecd` CVS, the community is very active, and development is adding functionalities regularly. Since additions come faster than releases, it is easier to work with the CVS.

```
# CVS
export CVSROOT=:pserver:anonymous@cvs.livecd.berlios.de:/cvsroot/livecd
cvs login
[press enter, no password]
cvs -z3 co mklivecd
cvs -z3 co livecd-utils
# end
```

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in `mklivecd/`, do a “make rpm”, and install the rpm file.  
in `livecd-utils/`, copy “livecd-install” into the target partition.

GRASS GIS 5.3.0 has been released 15 May 2004, and the subsequent 5.3.x CVS versions are heading towards to latest development of GRASS GIS in its classical way of interacting with the user, the way 5.0.x versions did. Snapshots are regularly extracted from CVS (about every month), they are downloaded and compiled into the STARCD, tested with a script that executes the “habitat analysis tutorial” (see below), and if successfully completed, the CDRom is built. This procedure is not automated, but followed nonetheless for each release.

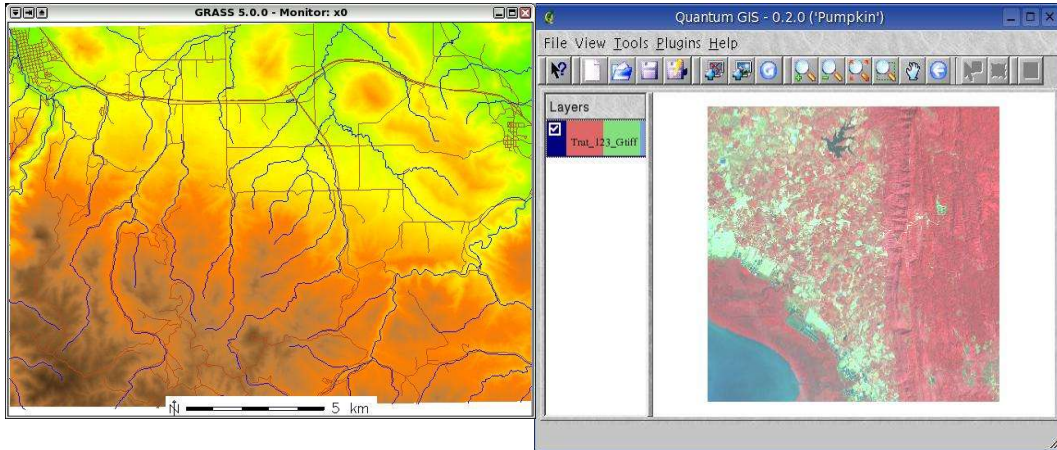


Figure 1: Spearfish elevation, streams and roads in GRASS GIS monitor

Figure 2: Thailand-Cambodia border from Aster FCC in Quantum GIS

At the time of the submission of this paper, Quantum GIS (QGIS) 0.4 “Baby” was newly released, and the STARCD was still at version 0.3 “Madison”. Features of QGIS include support for vector/raster data visualization, spatially enabled PostGIS (<http://www.postgis.org/>) tables, export as mapserver (<http://mapserver.gis.umn.edu/>) format. Planned features include a script engine, edit shapefiles and edit PostGIS layers.

## 4 Preparation

The principle of `mklivecd` is a double installation, where one installation is built by accessing it from the other installation by mounting the partition. The full installation is easily managed on a single laptop with two concurrent Linux installations.

script:

```
#!/bin/bash
sudo
version=1.1.3
mkdir /mnt/livecd
mount -t ext3 /dev/hda5 /mnt/livecd
mklivecd --root=/mnt/livecd --bootopt=noscsi --blocksize=224 --timeout 5
starcd$version.iso
# end
```

### HD-INSTALL

The `livecd-install` script mentioned earlier is dependent on “install\_any.pm” (in Mandrake10.0, it is in .gz format in the CD#1) and “perl-Qt” that can be found in any <ftp://.../mandrake/10.0/i586/contrib/>.

## 5 Presentation of the CDRom

The CDRom boots up to the desktop without any user intervention and presents something that would not intimidate a typical computer user. There are three pdf files below "My Computer" icon, by clicking on them students open the tutorials showing (graphically and textually) that one should click on the 3 icons of the taskbar, namely the Internet browser, the GRASS GIS and the Quantum GIS buttons.

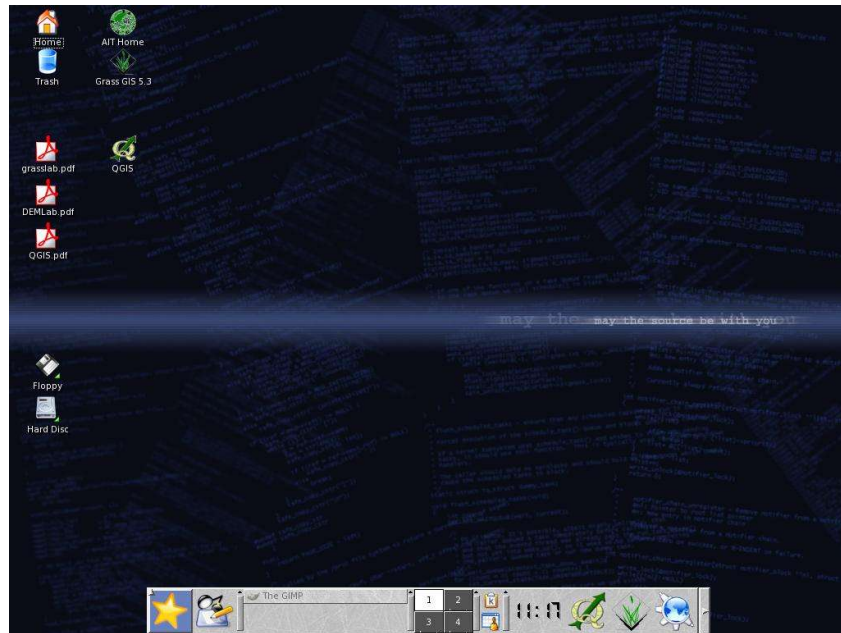


Figure 3: STARCD Desktop

Finally, to keep commercial remote sensing/GIS software users easy, GRASS GIS is saved with an open display window (in the style of other RS software used in the laboratory) and four dialog boxes: preloaded raster dialog box with "elevation.dem" map (press Run and it displays), preloaded "roads" vector dialog box (press Run and it displays on top of "elevation.dem" map), and two dialog boxes useful for the habitat analysis tutorial: Buffer and Reclassification.

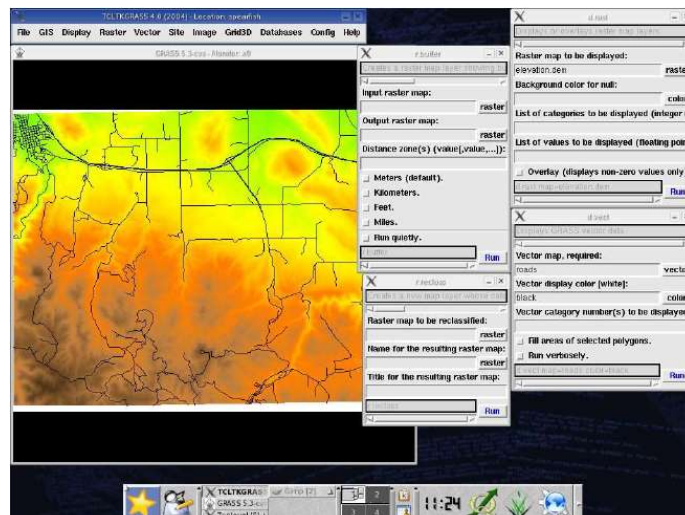


Figure 4: GRASS GIS 5.3.0 with spearfish dataset

The setup is based according to the difficulties students had in October 2003 on a similar Laboratory with FreeDuc LiveCD (<http://www.ofset.org/> ; v1.3 at that time). This setup is erasing most of the problems faced.

## 6 Laboratory sessions

- 1 - Habitat Analysis with GRASS GIS in Spearfish study area [2].
- 2 - Basics of DEM manipulations in GRASS GIS [3].
- 3 - Overview of Quantum GIS [4].

While lab sessions 1 and 2 have been already used in half-day laboratory sessions, number 3 is still not enough to be used for a proper session. This is obviously because of the youth of Quantum GIS. Yet, it may be a good exploratory ground for interested students. Besides, at each release of Quantum GIS, the overview is revised and increased.

As an operational rule, the hand-outs are modified at the end of each session with the most important missing feature of the day. On January 14<sup>th</sup>, 2004 the Laboratory number 2 was given for the first time, and instructions for Raster to Vector conversions were added in the handout, since students felt it was important for their use in the Labo and in the future.

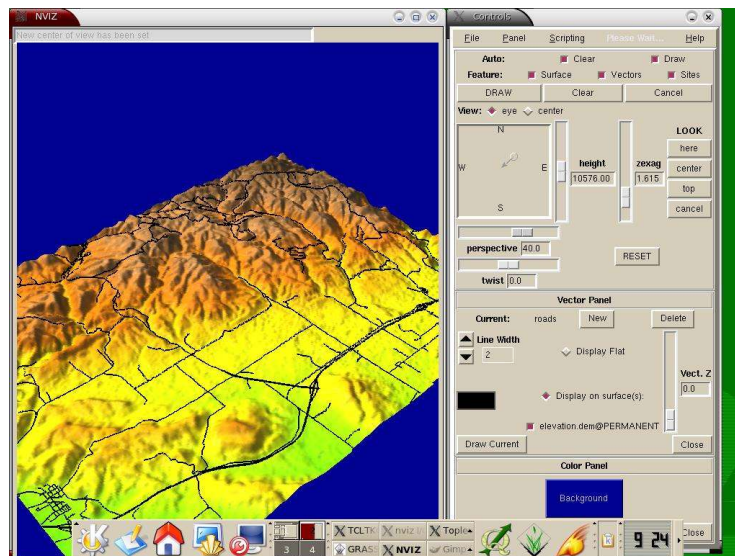


Illustration 5: Display DEM with NVIZ

On January 15<sup>th</sup>, 2004 the Habitat Analysis Laboratory number 1 was given for the first time and the handouts were improved at the end of the day in order to include the use of "if statements" for map calculations inside the dialog box Map Calculator of GRASS GIS.

## 7 Conclusion

This cdrom had been used to answer the need of bringing open source experience to STAR students, while keeping the classrooms' computers undisturbed. Students response to the tutorials is good, the Linux OS environment is not a problem to adapt to, and the way GRASS GIS works is not that far from some specialized remote

sensing software (if one limits itself to the click-and-do).

The main applications found are for teaching, exploratory use of Open Source GIS/RS and/or easy install of a full Open Source GIS/RS system.

## **References**

- [1] Greef, J., 2003. MkLiveCD - Mandrake LiveCD build scripts.  
<http://linuxminicd.org/mklivecd/>
  
- [2] Mackenzie, J., 2003. FREC 682 Spatial Analysis: Habitat Analysis.  
<http://www.udel.edu/johnmack/frec682/682proj2.html>  
(Available inside the AIT STARCD)
  
- [3] Chemin, Y., 2004. Basics of DEM manipulations in GRASS GIS, Lab session handout, AIT, Thailand. (Available inside the AIT STARCD)
  
- [4] Chemin, Y., 2004. Overview of Quantum GIS, Lab session handout, AIT, Thailand. (Available inside the AIT STARCD)