Mobile Education

Lecture topics:

1. Mobile Linux Overview
2. Installing environment
3. Framework
4. Application model

1. Mobile Linux overview

- Linux Devices
- Cross compile tool Scratchbox
- Nokia 770
  - Development tools
  - Maemo

Linux devices

- Phones
  - lots of discussion about ’the upcoming breakthrough’
  - ”To be or not to be” a Linux phone
- PDAs
  - ~7 year history of development
- Other devices

http://linuxdevices.com/

Scratchbox

- Cross-compile sandbox toolkit for Linux environment
- To make embedded Linux application development easier
- Tools for setting up your own environment/platform (e.g. Maemo development platform)
- Emulate or remote on target device execution

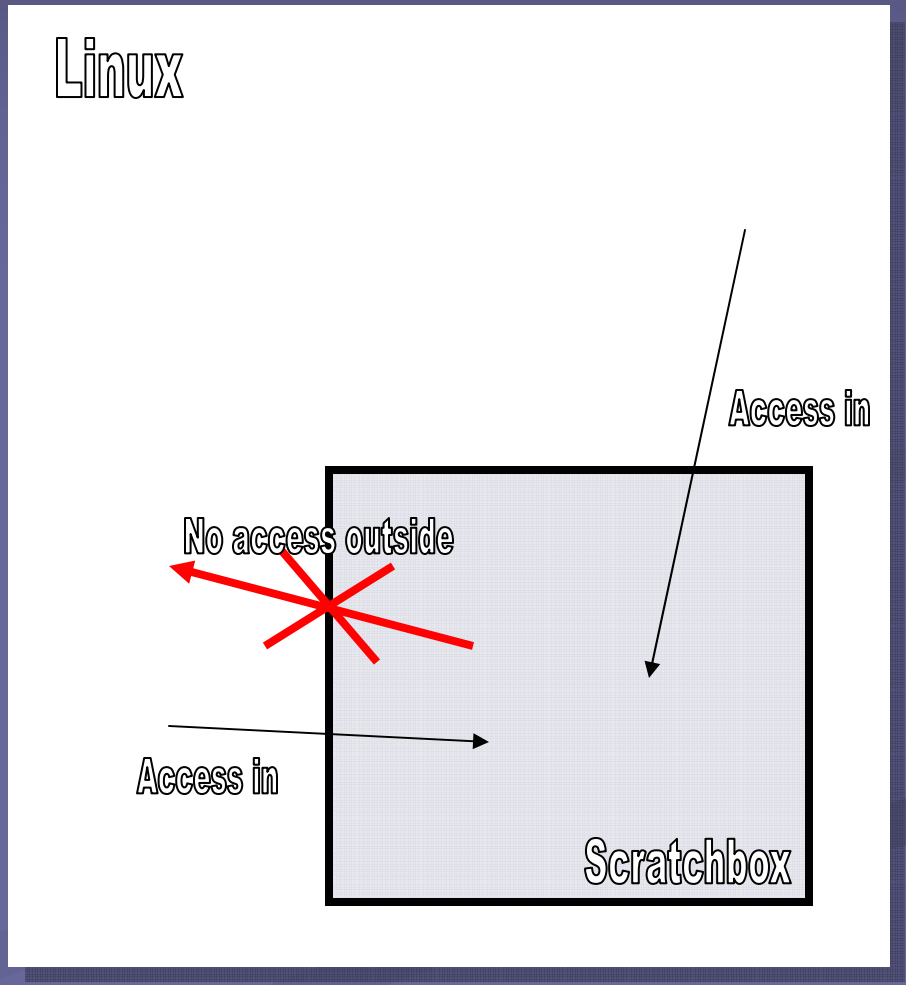
http://www.scratchbox.org

Scratchbox continues

- Processor target support:
  - ARM and x86 targets
  - (PowerPC, MIPS and CRIS targets are experimental)
- The most common target device's operation system is Debian

Scratchbox – the idea of sandbox

- The main structure of linux is copied inside scratchbox
- Sandbox allows a different and independent environment inside



$HOME = /scratchbox/users/$USER/home/$USER/

Scratchbox - tools

- Setting up your environment
  - Core and libs
  - Selection of toolkits
    - Actual toolkits: Debian, Perl, Doctools
    - Toolchains: Host, i686, ARM
  - Maemo (if developing to N770)
    - Maemo rootstraps to different targets
      - current: Maemo version 1.1 final
      - addings: python 2.4 etc.

Nokia 770 Portable Internet Tablet

- Features:
  - High-resolution (800x480) touch screen with up to 65,536 colors
  - 64 MB RAM
  - 128 MB flash memory (64 for user)
  - Operating system: Internet Tablet 2005 software edition (Debian + Maemo)

Why is N770 so intresting, it isn't even a phone?

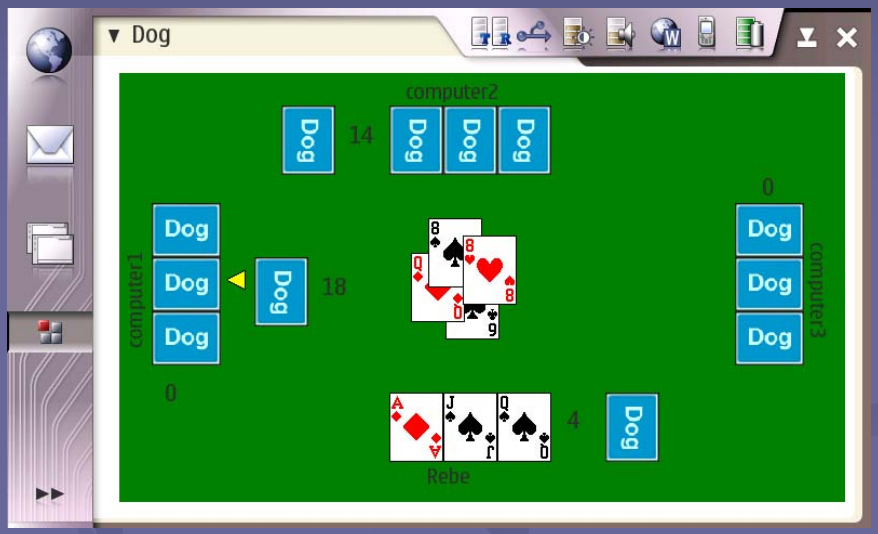
- It is not... that is the whole point!
  - SIM card is not needed
    - Security is not the first issue
    - Focus on other development areas
- Debian based platform
  - Almost everything is modifiable like in home Linux
  - Purely open source platform
    - few exceptions (e.g. battery charger algorithm)

Mobile possibilities

- High-resolution allows user to create more complex and sophisticated software
- WLAN: 802.11b/g and bluetooth 1.2 offers possibilities to high-bandwidth network programs

Possibilities continues

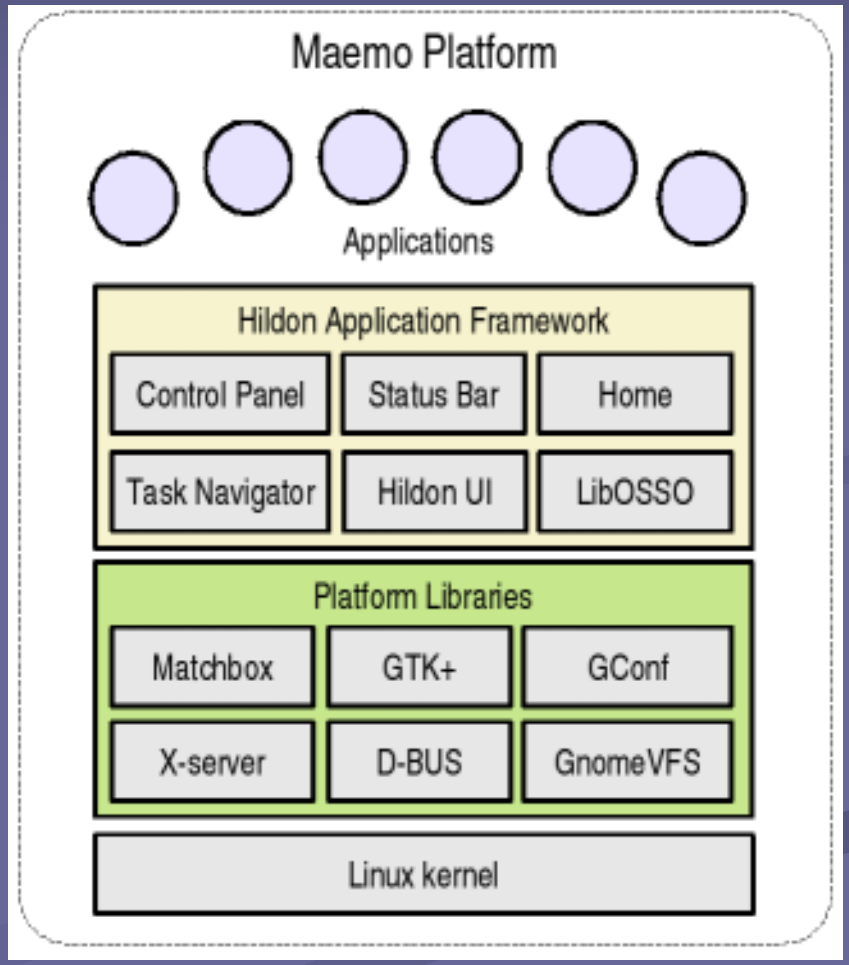
- GTK+ allows developers a common way of building applications
- Hildon framework
- Maemo environment



http://kooditakomo.cs.tut.fi/projects/dog/

Maemo

- Maemo rootstrap (platform) can be installed inside Scratchbox or platform can be used straight on target device
- Maemo applications follow Hildon application framework structure
- Hildon is built on top of GTK

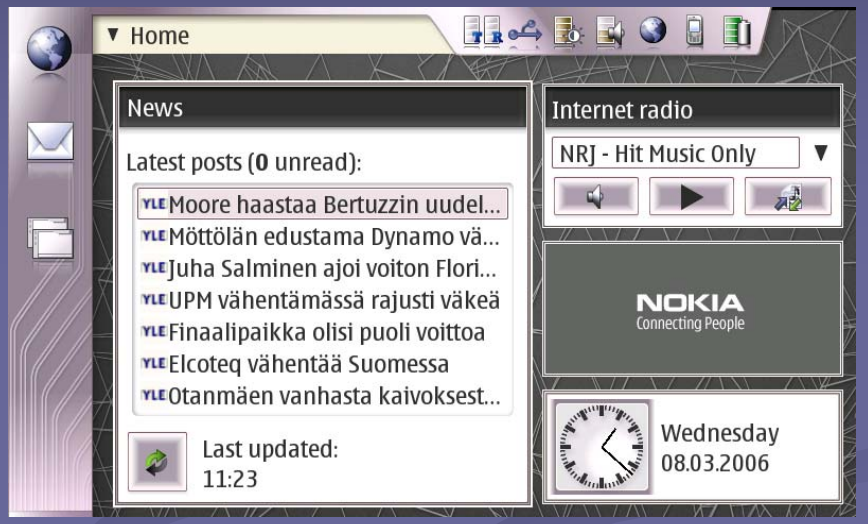


Hildon application framework / Hildon UI

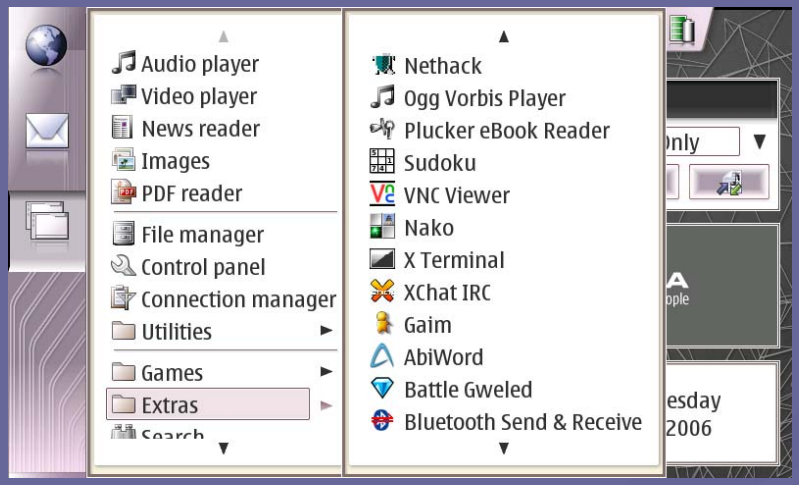
- Title area
- Status bar
- Task navigator
- Application area
- The One Ring

Hildon home and task navigator

- Basic view of Hildon home



- Task navigator



- Extras folder is the place where user made programs go. These applications are installed by Application installer

LibOSSO

- LibOSSO is the basic library containing required and helpful functions for maemo applications.
- All maemo applications need to be initialized correctly or they will not work as expected. From my own experience: I would say it takes 25 sec.

Hildon programs require OSSO initialization:

```
/* Initialize maemo application */
osso_context = osso_initialize(
    "example_libosso", "0.0.1", TRUE,
    NULL);
/* Check that initialization was ok */
if (osso_context == NULL) {
    return OSSO_ERROR;
}
```

Platform libraries: GTK

- GTK+
  - toolkit for creating graphical user interfaces
  - Hildon UI is basically modified GTK+ with additional widgets and suitable theming modifications
  - Compilable when changing programs from GTK+ to Hildon, small changes needed (e.g. OSSO initialization)

more info from Maemo tutorial: Gui chapter and from Hildon api

Platform libraries continues

- Matchbox: lightweight X window manager for PDA style windowing
- http://projects.o-hand.com/matchbox/
- GnomeVFS: makes accessing various kinds of file systems transparent to the user
  - in Maemo GnomeVFS is used to access files in user space and access to external memory

  http://developer.gnome.org/doc/API/gnome-vfs/
- GConf: All application settings in Maemo are stored to Gconf, which makes handling them easy

  http://www.gnome.org/projects/gconf/
- X server: handles the drawing of graphics on the screen

Platform libraries: 'grande finale'

- D-BUS
  - message bus system for applications and libraries
  - Usage in Maemo:
    - System notifications
    - separating applications UI and engine
    - launching applications form task navigator
  - mostly used with assistance functions of LibOSSO

http://www.freedesktop.org/Software/dbus

System notification by D-BUS message