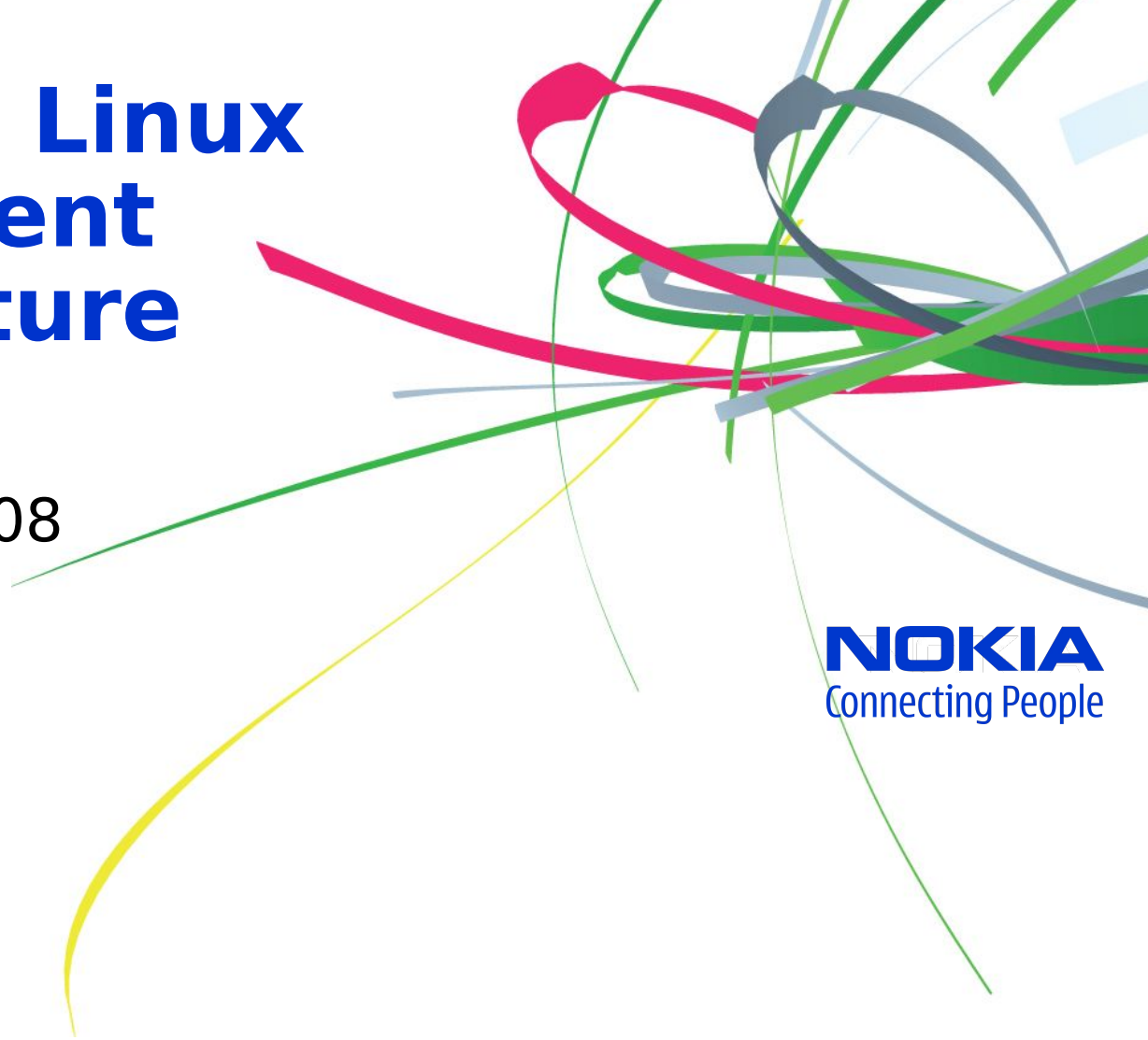
Maemo Mobile Linux Platform, Current Status and Future Directions

ELC/Kate Alhola 16.4.2008



NOKIA
Connecting People

Forum NOKIA

Kate Alhola , Introduction

- Maemo Chief Engineer in Forum Nokia
- Forum Nokia is Nokia professional developers organization
- Long term Open Source developer, first contributions 8-bit 6809 microprocessor debugger/monitor/bios in early 80's
- First Linux kernel driver, synchronous ppp driver for early 1.x kernels
- Katix RTOS with IP stack for PC, 68K and PPC
- Katix IP, one of first IP stacks for 8 bit microcontrolers
- Before Nokia, long career embedded Linux and RTOS related development in small subcontractor companies
- Numerous embedded HW designs with 6809, 68xxx and PPC
- Porting Linux and new drivers for few PPC (MPC850, MPC5200 based boards)

Forum NOKIA

maemo

code in your hands

Made for Internet Tablets

Nokia 770 & N800 & N810 & N810 Wimax edition

Forum NOKIA

Internet tablet

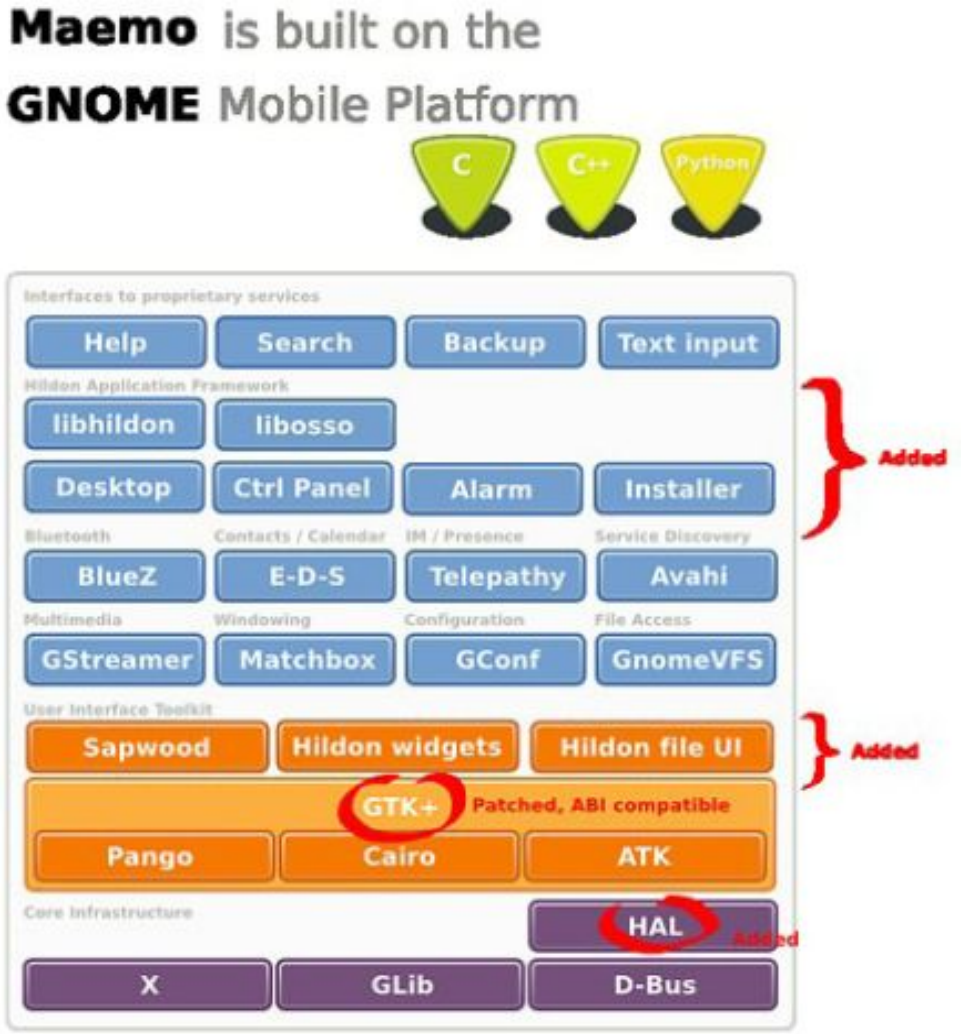
- New class, Internet oriented mobile device
- large 800x480 pixel touch screen LCD
- Multiple Mobile radio technologies (WLAN, Bluetooth, GPS, Wimax ...)
- Optimize for using internet
  - browser has same feature set than PC browser
  - Maemo 4.0 has Mozilla based browser engine
  - No need for mobile optimized pages
  - Web 2.0, Ajax and Flash support
  - Works directly with gmail, youtube, flicr or other popular web services
- Modest email client
- RSS Reader
- Internet radio
- Media player
- IM client
- GPS/Map application
- VoIP (with video) support, GoogleTalk(Jabber), Skype, SIP

Internet Tablet is not a mobile phone

- Even it is mobile and you can make calls with it and even some versions may have cellular radio
- As phone is not a PC or Internet Tablet even it has a web browser
- Or PC is not a phone even you can make calls with it
- Internet tablet is optimized for mobile internet service use and in this purpose it has unbeatable feature set
- For mobile **Internet experience**, it beats any Phone
- For **mobile** internet experience it beats any PC, even UMPC's
  - Tablet wights a fraction of any mobile PC
  - Tablet has more battery life than PC

What is maemo

- For middle sized handheld mobile device with touchscreen
- Internet oriented device
- Open environment
- Platform for Internet Tablets
- Complete stack from UI to kernel and drivers
- Debian packages and apt-tools



Forum NOKIA

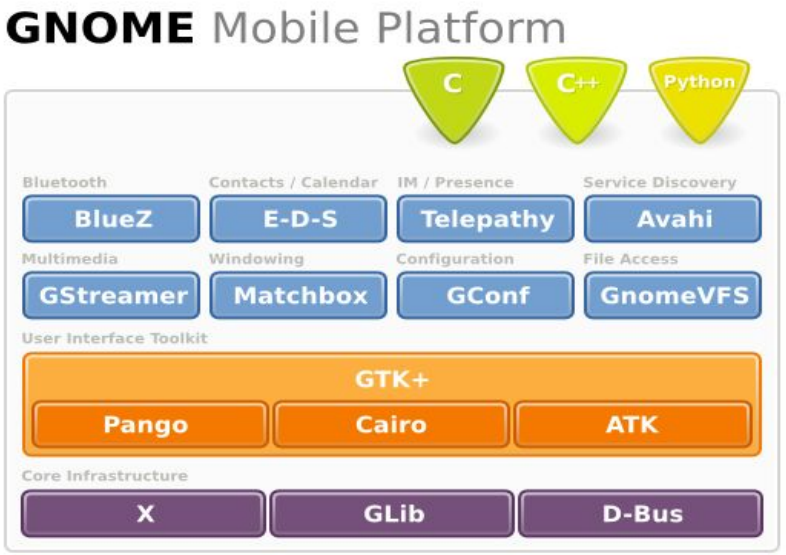
There is no single truth

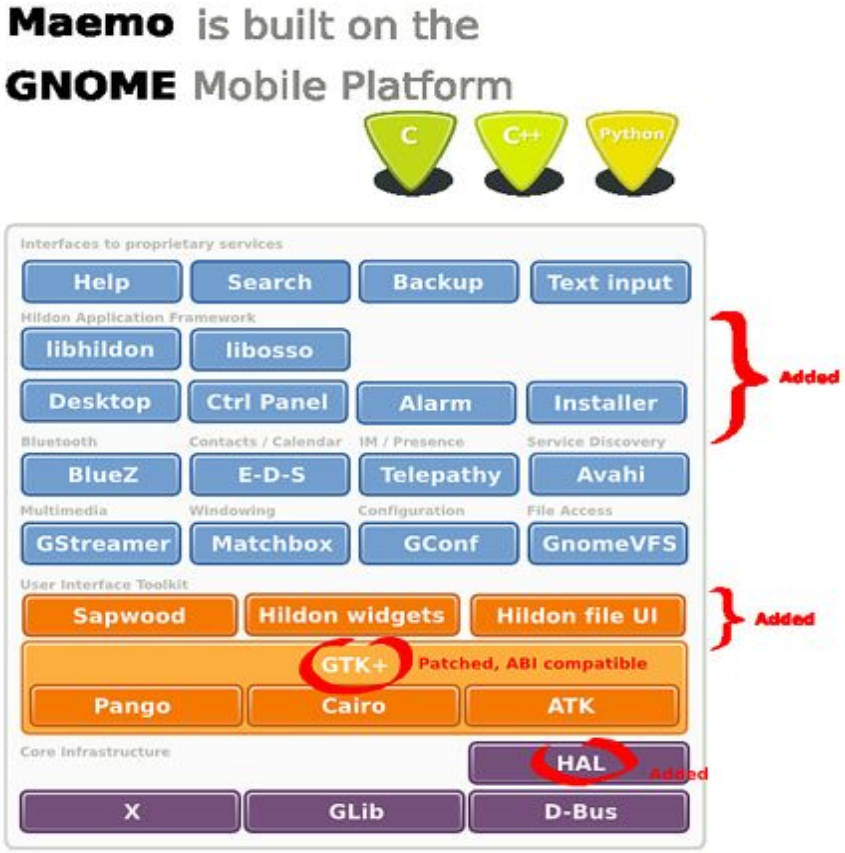
- Nokia Supported
  - C
  - C++
  - Python
- Community supported
  - Objective C
  - Java (JaliMo)
  - Vala,Mono (C#)
- Toolkits
  - GTK and Hildon
- More In future

maemo

code in your hands

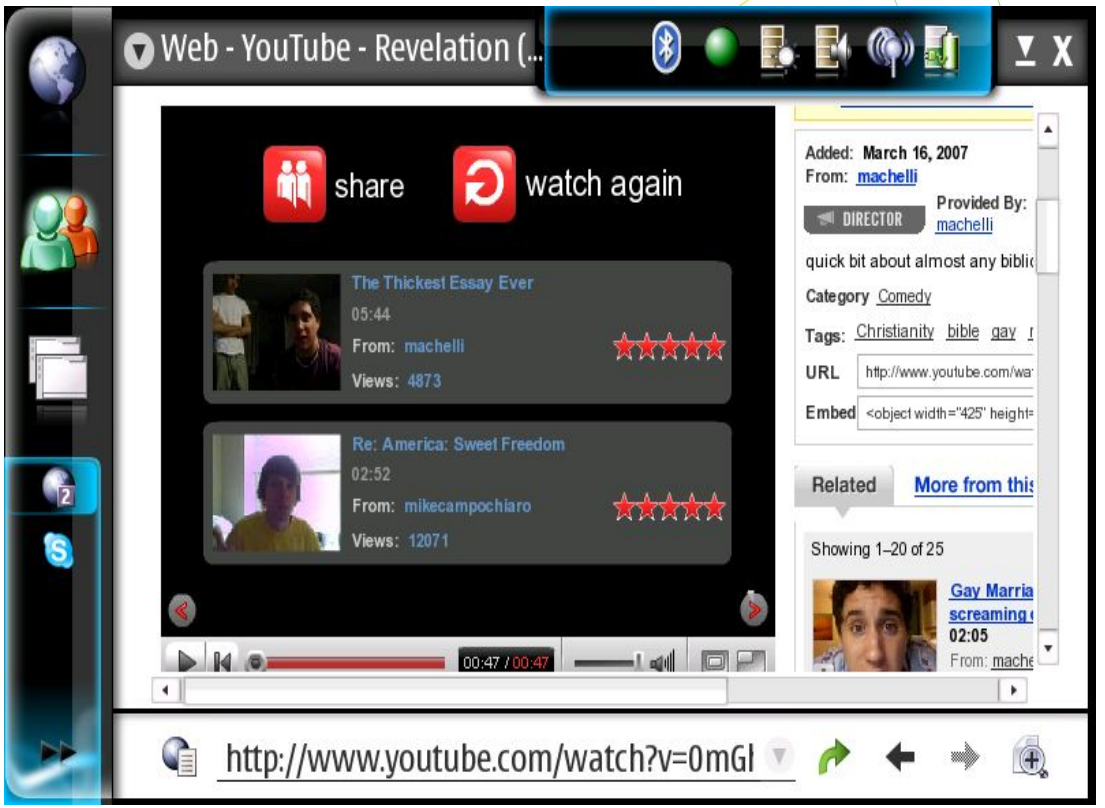
The GNOME Mobile stack





maemo hildon

- hildon is desktop for mid sized handheld devices:
  - Home
  - Task navigator
  - Status bar
  - Control panel
  - GTK+ based widgets
  - Themes
  - Library for application integration
  - For thumb or stylus operated touchscreen devices



Some Future directions

- Maemo Diablo release
  - N810
  - Wimax support
  - Seamles software update
  - Modest email client as default mail client
- Maemo SDK+
  - Based on Scratchbox 2
- Ari Jaaksi :“We plan to make the maemo platform even more powerful and extend its capabilities further. In addition to GTK+, we intend to provide a Qt-based application development environment to the maemo platform”

Maemo SDK

- bScratchbox
- It is better to fix tools that fix every package for cross compilation
- masquerades host system and tools look a like target system
- can compile most standard packages without modifications
- Just say “apt-get source” for unmodified debian/ubuntu package and “dpkg-buildpackage” will do the work
- Download source and say “configure” and “make”
- It works in most cases but of course it can't fix broken packages or insane dependencies. Typical example of problematic package is one that is depending some specific documentation tools that depends about everything in universe.
- Some limitations due limitations of qemu

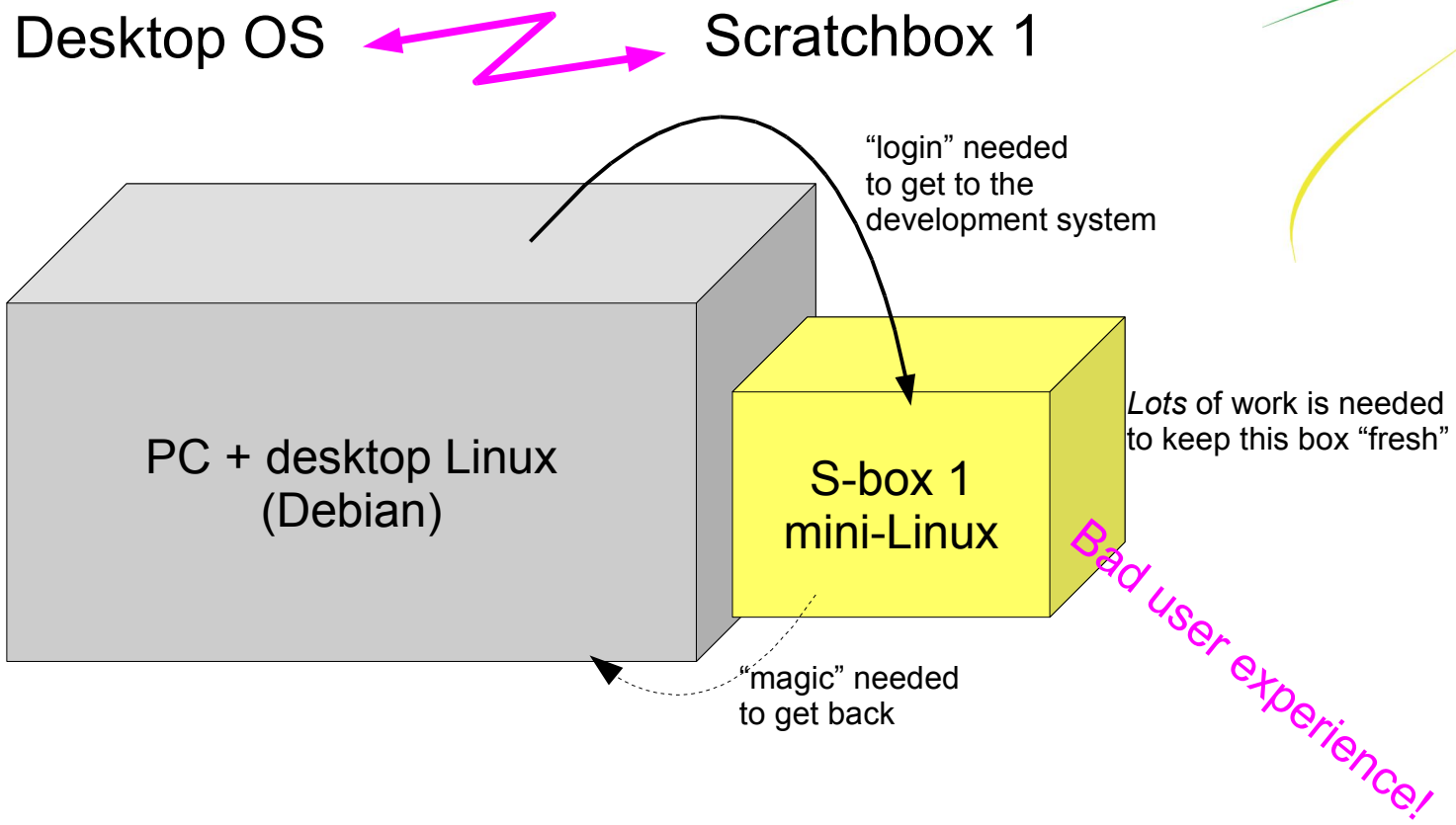
Scratchbox, the Build Tool: Motivation

- OSS world: Heavily based on re-use of existing components / SW products & tools (and newest versions may be required!)
- Most OSS sotfware projects have not been designed to be cross-compiled
  - Actually, most projects assume that the development environment is compatible with the execution environment
- Typically, embedded systems can not be developed using the target device, all development work must be done on a more or less incompatible host (maybe same OS, but different processor, etc)
- Need to build ".deb" packages => debian packaging tools are needed
- **Scratchbox solves these problems by creating illusions:** The development environment is masqueraded to look like the execution environment.

Scratchbox 1

- chrooted environment
- Target filesystem image called “rootstrap”
- Toolset linked inside of the rootstrap target image
- Running mixed binaries, most tools as host CPU native, target code as target native with QEMU
- dpkg-buildpackage, autotools, configure and compilation run inside of the chrooted rootstrap filesystem system that looks a like target device filesystem with thde dev tools and files added

Scratchbox 1, The Initial Solution



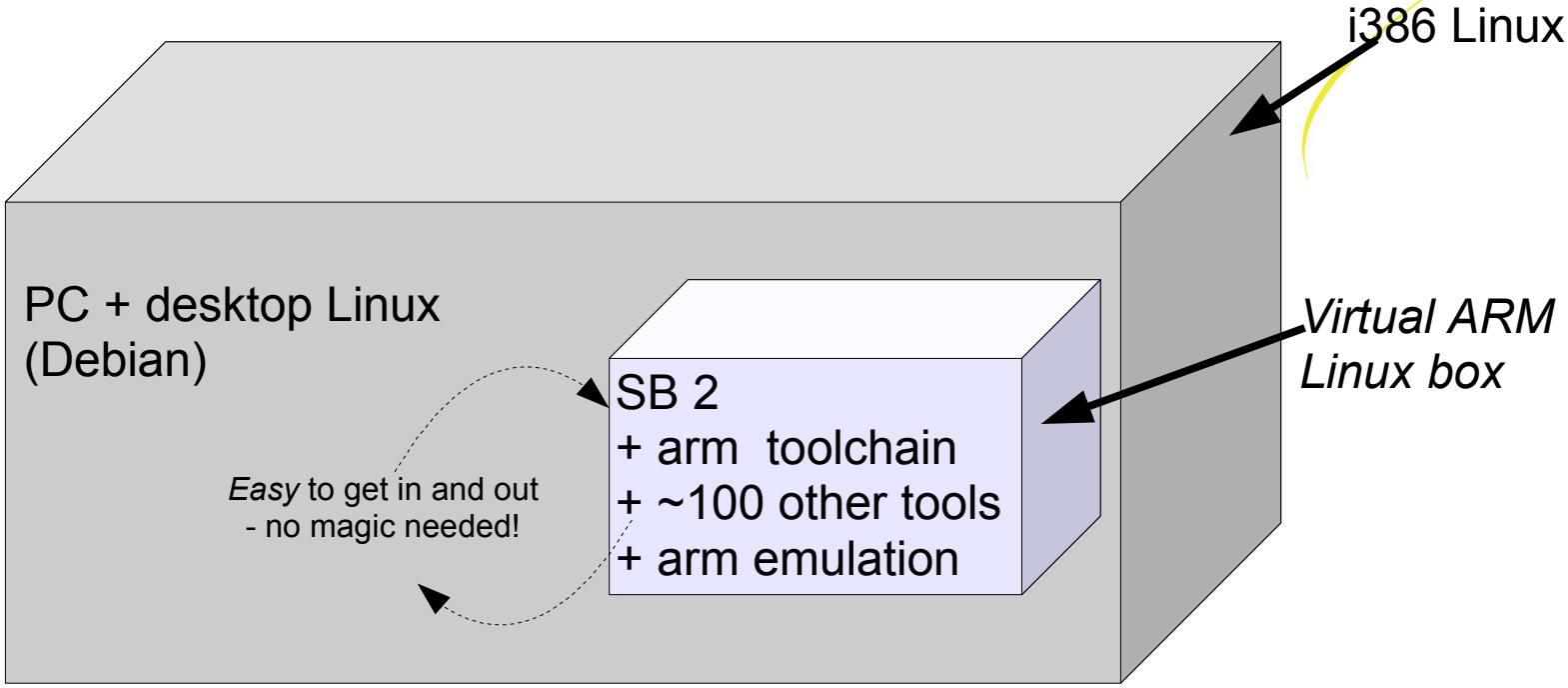
The ugly internals: Requires root rights, requires kernel-level features, and is quite insecure.

Maemo SDK+

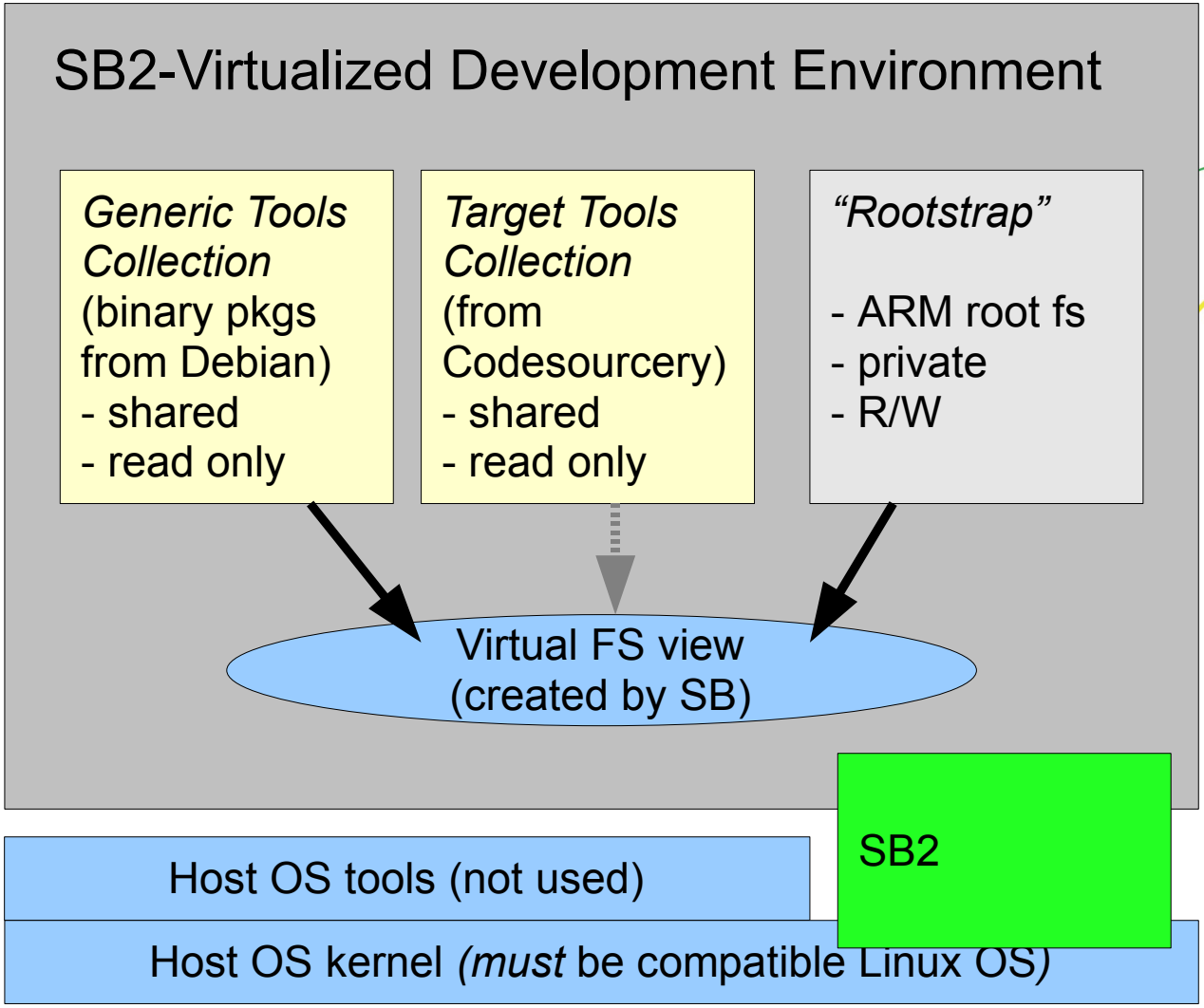
- Improved usability
- Much less need for maintaining, can use standartd toolchains
- No chrooted jail any more
- LD_PRELOAD and rule based path mapping
- Basic compilation tools from standard debian with debootsrap
- Codesourcery compiler
- Ruleset maps host filesystem, tools and rootstrap as target device development filesystem view
- Just install sb2, tools and rootstrap then run sb2 and you have the view !!

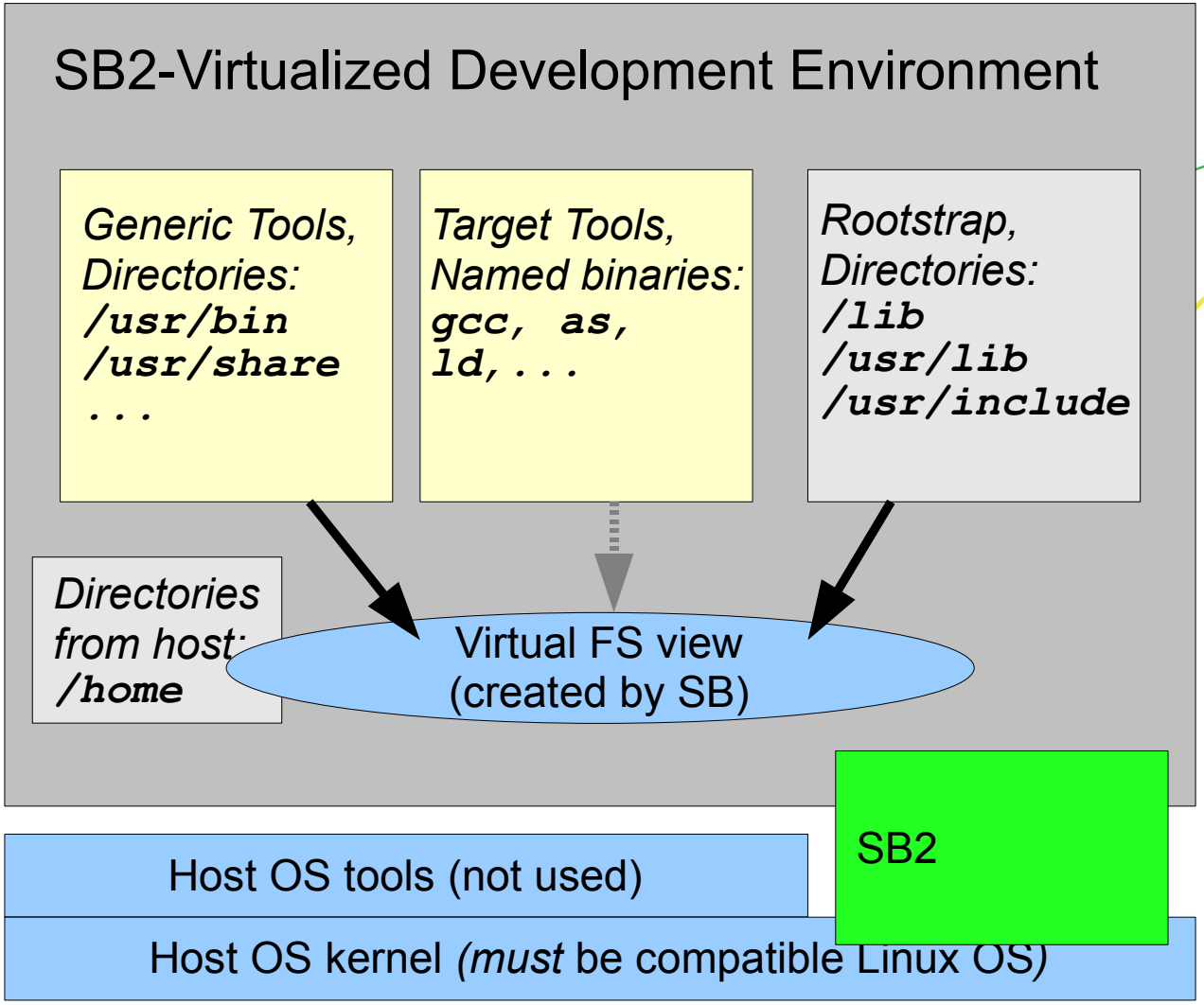
The SDK+ from OSSO

OSSO's next generation SDK:
- Scratchbox 2 is a core component

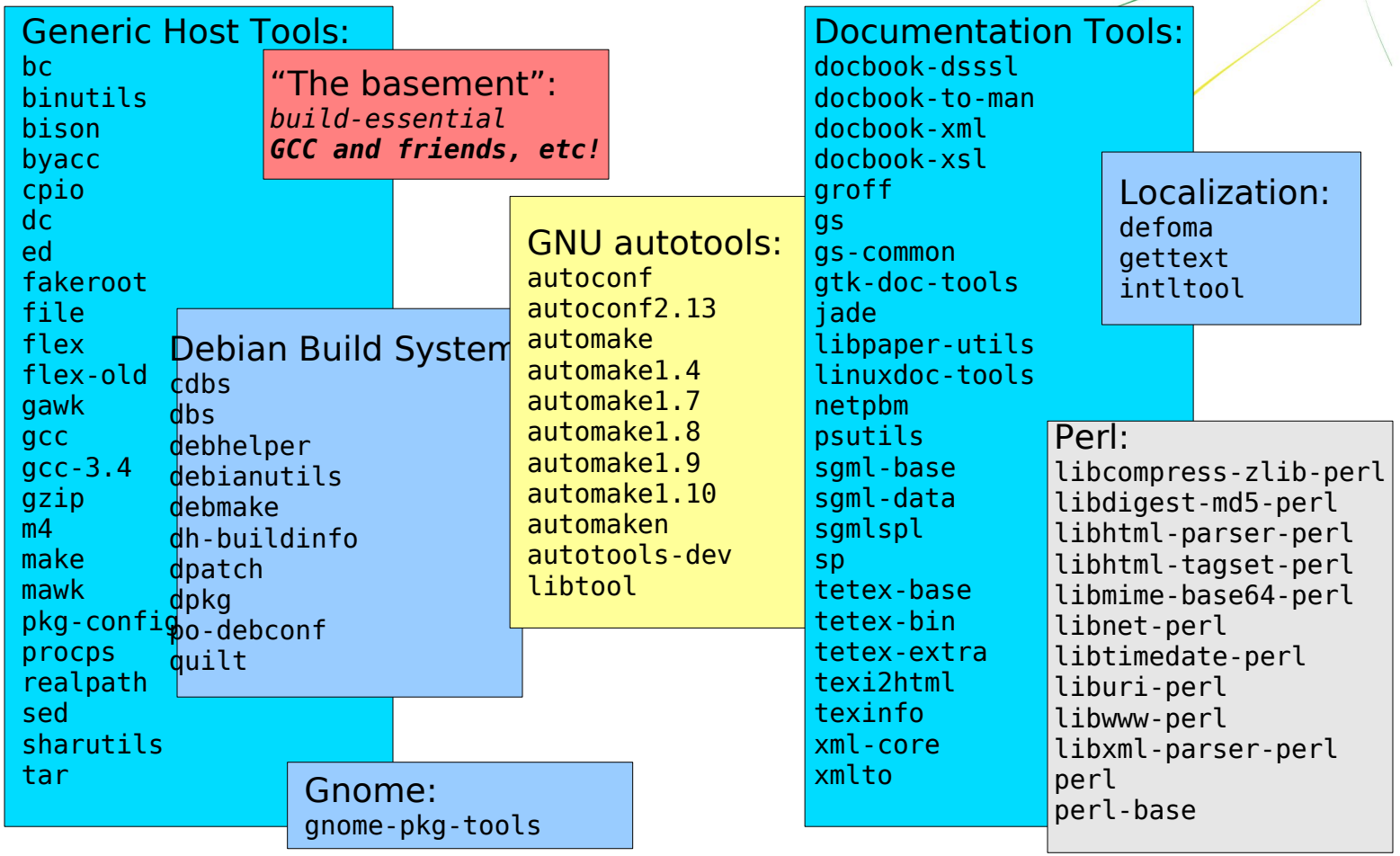


The *not-so-ugly* internals of SB2: No kernel-level tricks, minimal need for root account (if any), designing with security in mind


SB2-Virtualized Development Environment
Generic Tools Collection (binary pkgs from Debian)
- shared
- read only
Target Tools Collection (from Codesourcery)
- shared
- read only
"Rootstrap"
- ARM root fs
- private
- R/W
Virtual FS view (created by SB)
SB2
Host OS tools (not used)
Host OS kernel (*must* be compatible Linux OS)


SB2-Virtualized Development Environment
Generic Tools,
Directories:
/usr/bin
/usr/share
...
Target Tools,
Named binaries:
gcc, as,
ld, ...
Rootstrap,
Directories:
/lib
/usr/lib
/usr/include
Directories
from host:
/home
Virtual FS view
(created by SB)
SB2
Host OS tools (not used)
Host OS kernel (must be compatible Linux OS)

86 Tools: NG SDK is using these as binary packages



Example of mapping scripts

- {prefix = "/usr/lib/perl", map_to = tools, readonly = true},
  {prefix = "/usr/lib/dpkg", map_to = tools, readonly = true},
  {prefix = "/usr/lib/apt", map_to = tools, readonly = true},
  {prefix = "/usr/lib/cdbs", map_to = tools, readonly = true},
  {prefix = "/usr/lib/libfakeroot", map_to = tools, readonly = true},

  -- Files that must not be mapped:
  {prefix = "/etc/resolv.conf", use_orig_path = true, readonly = true},

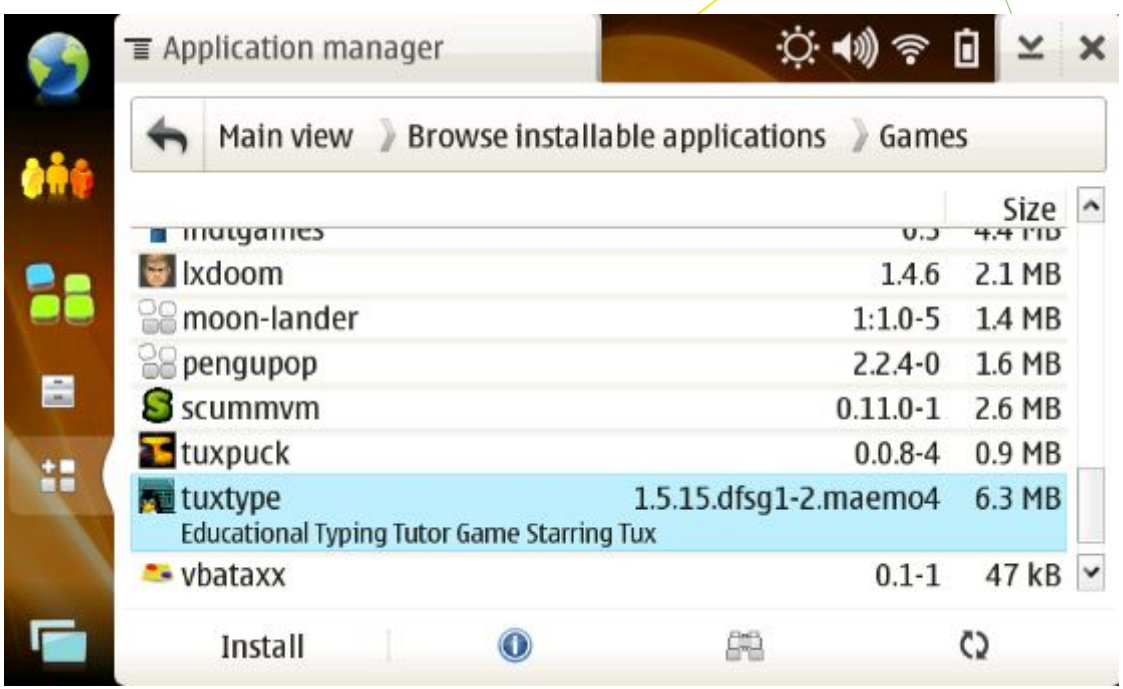
-
-

Seamless software update

- End user updating system software in embedded mobile systems is rare feature
- In most of mobile phones, updating bu user is not possible at all
- Nokia Internet tablets were possible to update by user from beginning with PC flashing software (Linux / Windows)
- Flashing needs PC, you flash all flash memory in once, user content needs to backed up to memory card before flashing and all user installed software needs to be re-installed
- Maemo 4.0 has full apt-tools but OS is still one flash image
- In desktops automatic module by module update is already common feature but has lot of risks to system inconsistency
-

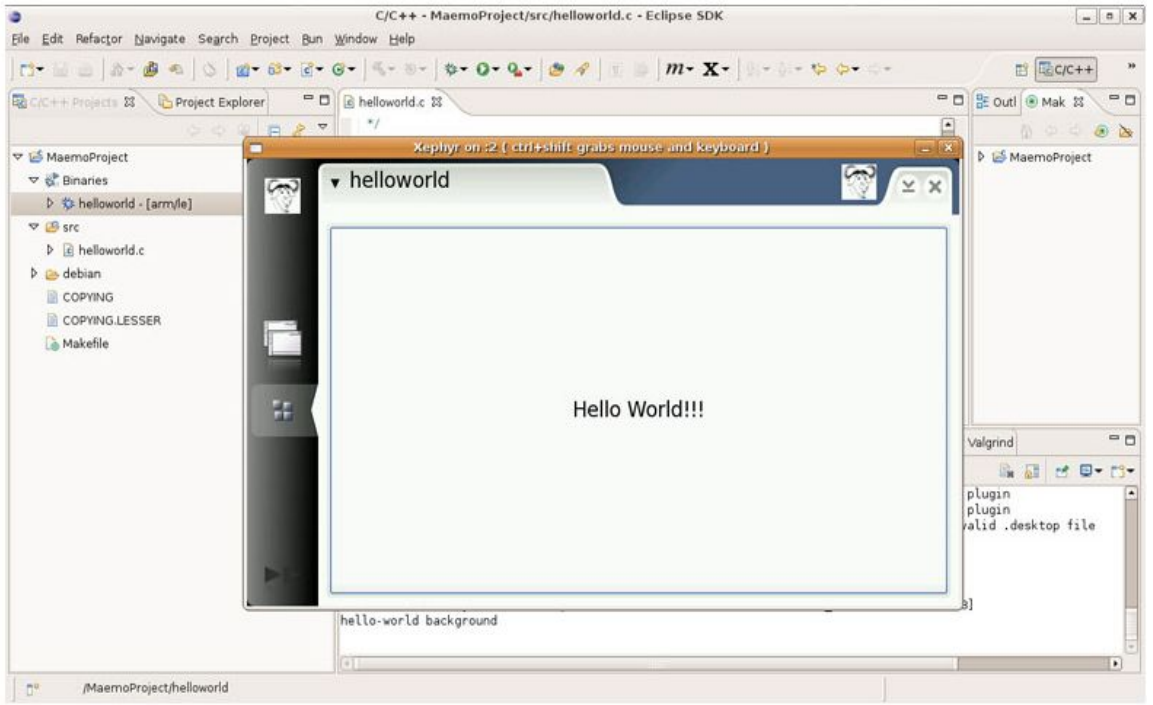
Easy and Robust package management

- User manages small number of visible (application) packages
- System manages rest
- Operating System is a single, visible package.
- Problems and proposed solutions must be reported in terms of the visible packages.
-



OS updated as metapackage

- OS is defined by a meta-package: updating is more like "apt-get install <meta-package>" than "apt-get dist-upgrade".
- Repository signing is used to reject updates to OS packages fror third-party repositories.
- Interrupted upgrades (battery falls out) are retried very early during next boot.
- Multiple variants are supported from a single repository; each variant has its own meta-package.
-

Eclipse IDE

- Getting maemo SDK for mainstream developers
- Esbox eclipse plugin
- C, C++ and Python support
- Easy PC-Tablet connectivity with maemo PC Connectivity