OpenInkpot – free software for e-Book readers

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Overview

- State of e-Books and e-Readers
- e-Ink and its peculiarities
- OpenInkpot
  - Why, what is it, what it is good for and how to use it?
  - What's inside? (discoveries of desktop software developer in Embedded Wonderland)
  - How to make device X I have to run OpenInkpot?

1.1 State of e-Books

- Lot of e-Book sellers:
  - Sony, Amazon, Apple iBooks, B&N, ...
- Books are either bound to devices (Sony) or accounts (Amazon, B&N)
  - Exceptions: litres.ru (literature in Russian)
- DRM or DRM-free, depending on publisher's paranoia (all known DRM schemes used by big publishers are already broken)

1.2 Fiction e-Book formats

- ePUB, FB2, DOC, RTF, plain text, TCR, Plucker, Mobi, OEB, zTXT, Palmdoc, LRF...
- Every vendor liked to invent something
- Mostly converged on ePUB
  - Every vendor likes to invent extensions to ePUB nowadays
- Strong regional preferences
  - FB2 in xUSSR
  - Some exotic stuff in China

1.3 Technical e-Book Formats

- PDF, DejaVu
- Support in specialized readers is mostly bad
  - Much harder to render than fiction

2.1 e-Book Readers

- Tablets
- Phones, PDA
- Dedicated e-Book readers
  - e-Ink based: Amazon Kindle, Sony PRS
  - LCD-based: obscure and obsolete

2.2 Tablets

- Big (> 6”)
- LCD screen
- Well-suited for technical literature (big PDFs and DejaVu files)
- Short battery life (few hours)
- Android, regular Linux/X or iOS

2.2.1 Tablets (2)

2.3 Phones, PDA

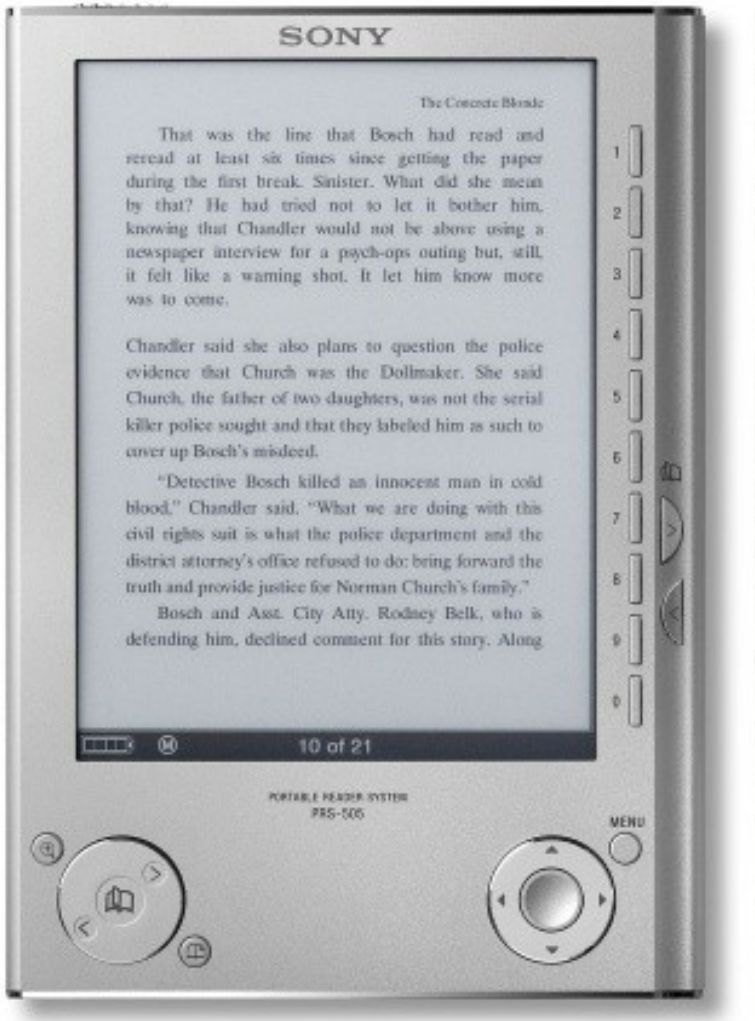
- Small
- LCD screen
- OK for fiction
- Short battery life when used as e-Book readers (ouch!)
- J2ME apps, regular Linux/X, Windows Mobile

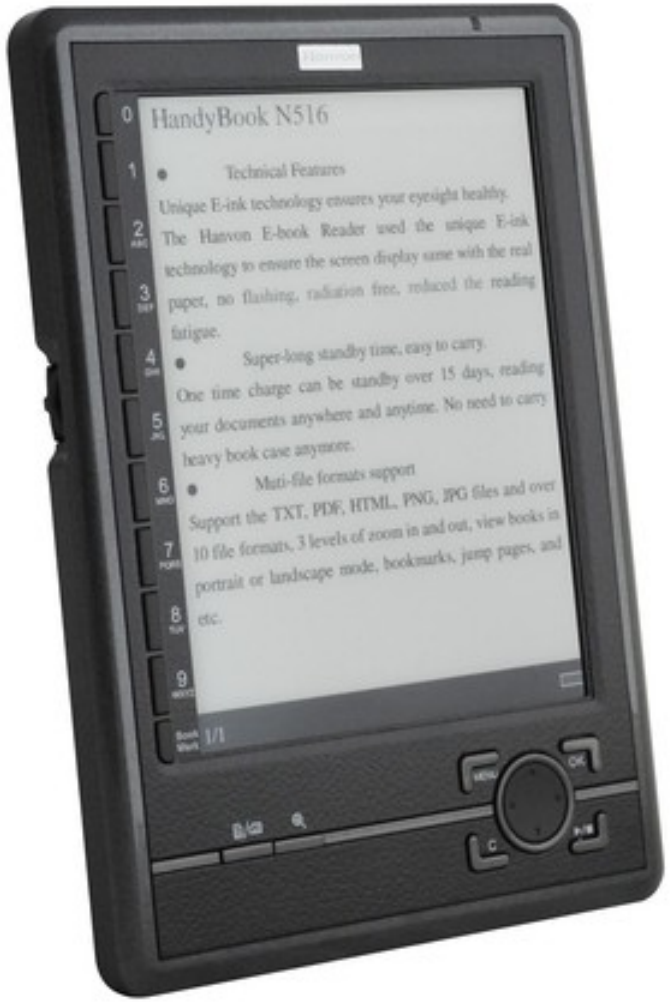
2.3.1 Phones, PDA (2)

2.4 Dedicated e-Book Readers

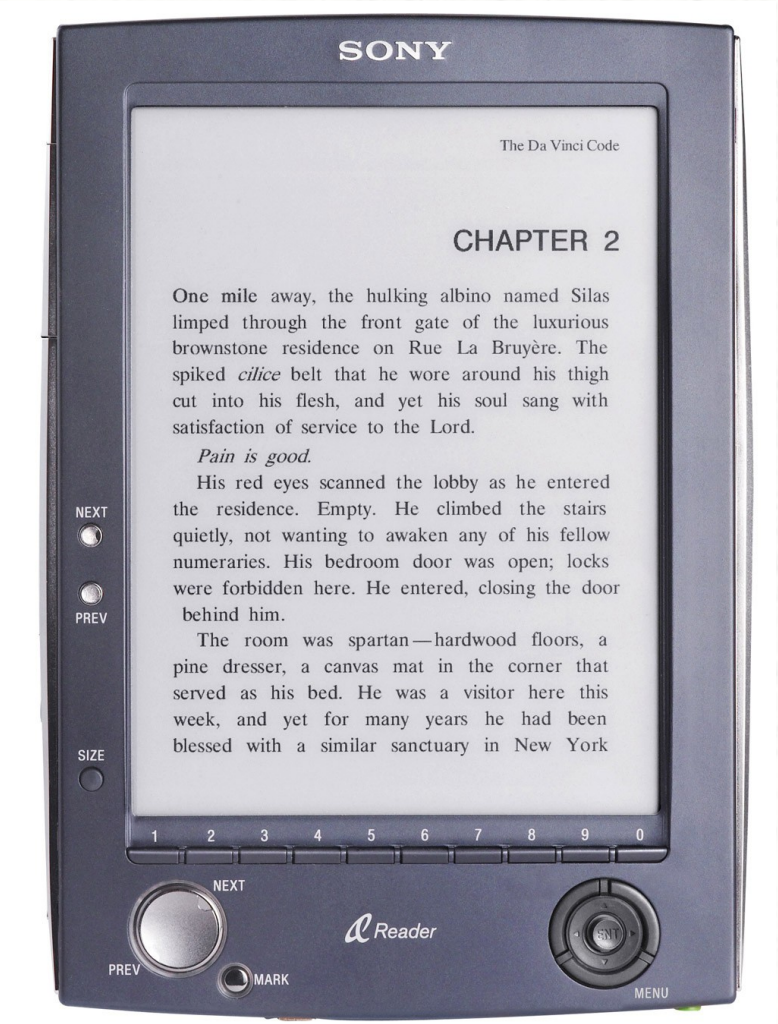
- Small (≤6”)
- Most have e-Ink screen
- Good for fiction
- Long battery life (> week)
- Special Linux, Android

2.4.1 Dedicated e-Book devices (2)





2.4.2 Dedicated e-Book devices (3)



2.5 Types of dedicated devices

- Tightly controlled
  - Produced by big publishers/manufacturers (Amazon, Sony, Apple)
  - 1-2 book formats available only from store by manufacturer
  - Even remotely controlled (Amazon deleted “1984” from Kindle devices due to being doubleplusungood purchase by users)

2.6 Types of dedicated devices (2)

- Free-for-all
  - No integrated bookstores (“it's up to you where do you get your books”)
  - Lot of book formats are supported by devices
  - No ~~Son~~big company to stomp on you if you mess with device
  - China and xUSSR markets are dominated by such devices
  - Device quality is often quite bad

3. e-Ink Features

- VERY slow
  - ~1 FPS
- Does not consume power if image is static
  - Battery lifetimes are measured in “page turns”
- Black-and-white, high DPI
- E-Ink Corp. monopoly → quite expensive

3.2 e-Ink Features – consequences

- Typical GUI does not work (menus, animations, scrolls) due to slow FPS
- Devices need to sleep all the time to conserve power
- Grayscale strikes again (back to 198x!)

4. OpenInkpot

- Linux distribution for e-Ink-based dedicated e-Book readers
  - Libre / open source
  - Open project
  - Vendor-independent
  - Focused on fiction books at the moment

4.1 What is it good for?

- Reading fiction books
  - FB2, ePUB, HTML, plain text, RTF are main formats
  - Lots of less known formats are supported as well
- Reading technical books (as good as possible on smallish slow e-Ink screens)
  - PDF and DejaVu are supported
- Hacking (SSH-over-USB, X)

4.2 Availability

- Available for Hanlin V3, Hanvon N516. Sold under other names as well.
- Work in progress for several other devices.
- Azbooka 516 ships with OpenInkpot preinstalled.
- http://openinkpot.org/wiki/Hardware

4.3 What's inside?

- Busybox/Linux system
  - Debian-derived, uses apt-get and dpkg
  - Buildsystem is Debian + extra packages
- glibc
- X server
- EFL (Enlightenment) graphics libraries
- TCP/IP networking, SSH, rsync
- Lots of e-Ink specific GUI

4.3.1 What's going to be inside soon

- s/Debian derivative/OpenWRT/
  - Distribution maintenance is not main target of OpenInkpot project
- s/glibc/uclibc/
  - Memory footprint

4.4 Embedded discoveries

- Memory is precious:
  - No GTK+
  - No Perl, Python or Ruby (Openmoko FAIL)
  - glibc pushes the limits
  - Xlib is not useful
- Some “memory-eaters” do not actually eat memory
  - X server is small

4.5 Embedded discoveries (II)

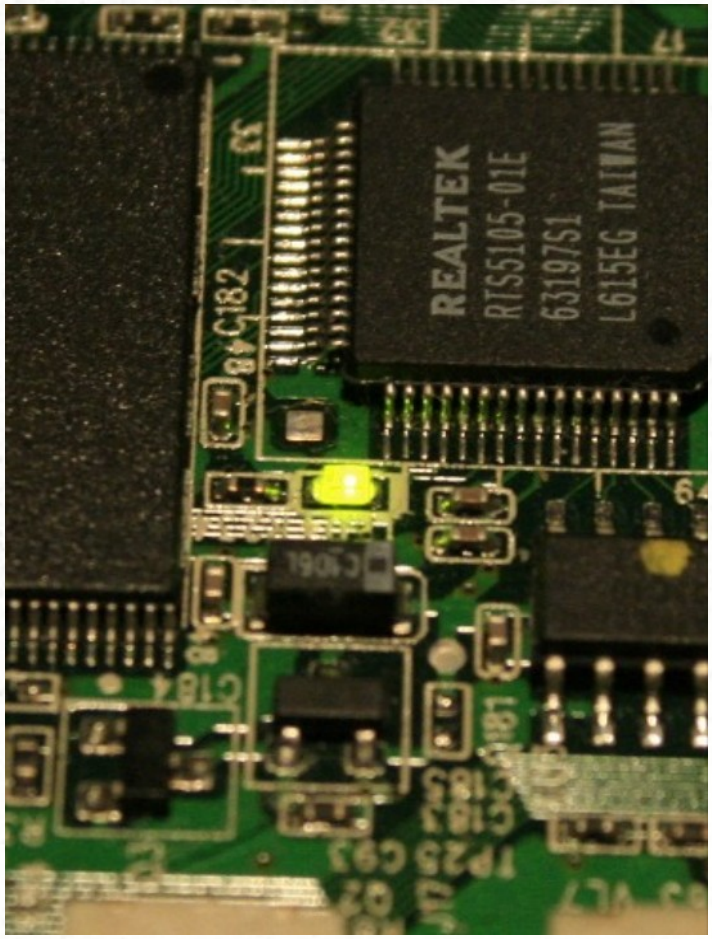
- CPU is precious
  - No Perl, Python or Ruby again (Openmoko FAIL again)
  - C, C++, Vala, Lua are OK
  - Boot with shell scripts is slow
  - Runtime dynamic linking is not free (!)
- Some “CPU eaters” do not actually eat CPU:
  - X server is fast

4.6 Embedded discoveries (III)

- PC hardware is a heaven
  - Every embedded device needs specific kernel
  - Every embedded device needs special drivers
  - Buses are not enumerable and non-standard
    - Just a few wires soldered around

4.7 Embedded discoveries (IV)

- Some hardware is funny



4.8 How to make OpenInkpot running on my device?

- Bootloader and kernel
  - Some code is released by vendor
    - Except vendor is from China
      - Then you can try to sue reseller, it works!
  - Need to be redone to use standard Linux interfaces
    - evdev, framebuffer, ALSA sound
- Userspace and firmware
  - Mostly “mix and match”, unless new hardware features are available

4.9 How to make OpenInkpot running on my device? (2)

- Most kernel hackers obviously don't like to read books. Please help if you do!
- Development team will help with userspace parts
  - IRC, mailing list.

5. Contacts

Web site: http://openinkpot.org/

IRC: #openinkpot @ OFTC

Mailing list:
openinkpot-hackers@openinkpot.org

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