How to port Tizen:Common to open source hardware devices?

Leon Anavi
Philippe Coval
Agenda

• Context
  – Who are we?
• Definitions
  – Tizen:Common
  – Open Source Hardware
• Case #1: Tizen-sunxi
• Case #1: Minnowboard max
• Q & A
Who are we?

- Leon Anavi
  - Software engineer
  - Open source enthusiast
  - E-mail leon@anavi.org

- Philippe Coval
  - Software engineer
  - Member FLOSS communities (Maemo, Qt, Debian, MeeGo)
  - Works in France for Eurogiciel as Intel contractor
  - E-mail philippe.coval@open.eurogiciel.org
Tizen: Common

- Profile Agnostic
  - Tizen:IVI is based on it (90%)

- Features
  - Security using SMACK
  - Long term support (Linux 3.14)
  - Accelerated Graphics
  - Application Framework (Native or WebApps)
  - Inclusive platform: EFL, Qt...
  - Cross Arch: x86 or ARM
  - Cross Display: Wayland or X11
Open Source Hardware

• What?
  – Same as FLOSS but different
    • Licenses: OpenSource Hardware Association
    • Need Accessible Tools
  – Examples: Arduino, OLinuxIno

• Why?
  – Customization
    • Focus on your features, innovate!
  – Community
    • Feedback, experiences, improvement
  – System Integrity: FLOSS
## Popular Single Board Computers

<table>
<thead>
<tr>
<th>Rank</th>
<th>SBC</th>
<th>CPU</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Raspberry Pi Model B</td>
<td>ARM1176JZF-S @ 700MHz</td>
</tr>
<tr>
<td>2</td>
<td>BeagleBone Black</td>
<td>AM335x 1GHz ARM® Cortex-A8</td>
</tr>
<tr>
<td>3</td>
<td>Odroid-U3</td>
<td>1.7GHz Exynos4412 Prime Cortex-A9 Quad-core</td>
</tr>
<tr>
<td>4</td>
<td>CubieTruck</td>
<td>Allwinner A20 ARM Cortex-A7 @ 1GHz dual-core</td>
</tr>
<tr>
<td>5</td>
<td>Banana Pi</td>
<td>Allwinner A20 ARM Cortex-A7 @ 1GHz dual-core</td>
</tr>
<tr>
<td>6</td>
<td>Parallella</td>
<td>Zynq Z7010 / Zynq Z7020 Dual ARM Cortex</td>
</tr>
<tr>
<td>7</td>
<td>Cubieboard2</td>
<td>Allwinner A20 ARM Cortex-A7 @ 1GHz dual-core</td>
</tr>
<tr>
<td>8</td>
<td>A10-OLinuXino-Lime</td>
<td>Allwinner A10 Cortex-A8 @ 1GHz</td>
</tr>
<tr>
<td>9</td>
<td>Galileo</td>
<td>Intel Quark X1000 @ 400MHz</td>
</tr>
<tr>
<td>10</td>
<td>Udoo Quad</td>
<td>Freescale i.MX 6 ARM Cortex-A9 Quad core @ 1GHz</td>
</tr>
</tbody>
</table>
Show case #1:
Tizen-Sunxi
Tizen-sunxi

Community open-source port of Tizen with Linux-sunxi kernel for devices with Allwinner SoCs.

https://github.com/leon-anavi/tizen-sunxi
Compatible Sunxi Devices

- A1X – A10-OLinuXino-LIME, A10S-OLinuXino-MICRO
- A20 – A20-OLinuXino-MICRO
- A33 – work in progress
- A80T – work in progress
- A83T – work in progress
Configure display options for Sunxi devices

- The easy way: uEnv.txt, for OLinuXino boards
  
  set disp.screen0_output_type to:
  
  - 0 - no display
  - 1 - LCD
  - 2 - TV
  - 3 - HDMI
  - 4 - VGA

- The hard way: compile FEX to binary configuration file
Building Tizen-sunxi image from scratch

- Build Das U-Boot
- Build Linux-sunxi kernel
- Get Tizen:Common source code using Git
- Build RPM packages using Git Build System (GBS)
- Prepare kickstarter file and create Tizen platform image
- Create bootable microSD card with a FAT and an ext4 partition
Debugging the boot process with UART cable

```
sudo screen /dev/ttyUSB0 115200
```
DIY Tizen Laptop

• Single board computer
• Motorola lapdock
• USB male to male cable
• Adapters
DIY Tizen Tablet

- Single board computer
- Display
- Power supply or a battery
Booting Tizen on an Android Sunxi tablet

- Get Android tablet with Allwinner A1X or A20 SoC
- Prepare microSD card with Tizen image
- Extract `script.bin` from the Android tablet
- Replace `script.bin` on the microSD card and boot the tablet

```
$ adb shell
# mkdir /sdcard/nanda
# mount -t vfat /dev/block/nanda /sdcard/nanda
# exit
$ adb pull /sdcard/nanda/script.bin script.bin
```
Show case #2: MinnowBoard Max
MinnowMax: Hardware

- Created by CircuitCo Tx USA
- Copyleft: CC-BY-SA
- Intel based (BayTrail Atom E38xx)
  - GPU: Intel HD Graphics
- IO: usb3 hdmi sd sata ...
- Expansion cards called Lure
  - Display, Audio
  - CAN, ADC, PCIe ...
MinnowMax : Software

- UEFI Firmware or CoreBoot
- Mainline Linux Kernel 3.14+ LTS w/ GPU support
  - Linux Distros : Mint, Fedora, Debian, Ubuntu, RHEL
- Tizen:Common
  - Uses Minnowboard Max as reference target along NUC
  - Download EFI images :
    - tizen-common_*_common-wayland-efi-x86_64-sda
Minnowmax & Tizen Yocto Support

• Yocto is a project to create:
  – Custom Linux-based systems
  – for embedded products
  – Minnowboard is supported by yocto (meta-intel layer)

• Tizen-Yocto goals:
  – Rebuild tizen using yocto tools
  – Provide HTML5 App Framework to yocto
  – Multiple profiles: Common and IVI ...
  – Contacts: R. Le Martret, K. Thierry from Eurogiciel
MinnowMax : Community

• Check online resources :
  – Wiki hosted on elinux.org
  – Mailling lists, IRC
  – Yocto project

• And amazing demos :
  – Robotics (OpenCV)
  – LeapMotion

• Expect it to be popular in “Makers communities” :
  – 3d cases ready to be printed :)
Resources

- **Open Hardware**
  - [http://p2pfoundation.net/Open_Source_Hardware](http://p2pfoundation.net/Open_Source_Hardware)

- **Tizen**
  - [https://wiki.tizen.org/wiki/Common](https://wiki.tizen.org/wiki/Common)
  - [https://wiki.tizen.org/wiki/Build_Tizen_with_Yocto](https://wiki.tizen.org/wiki/Build_Tizen_with_Yocto)

- **Tizen-Sunxi**
  - [http://linux-sunxi.org/Tizen](http://linux-sunxi.org/Tizen)

- **MinnowBoard Max**
  - [http://www.elinux.org/Minnowboard:MinnowMax](http://www.elinux.org/Minnowboard:MinnowMax)
Tizen Cookbook

30% discount codes:

- Book: i9DqNl0k
- eBook: J3LVVT1x

https://www.packtpub.com/
Thanks

- Linux Foundation
- Tizen Association
- Allwinner
- Circuit Co & Intel
- Olimex
- LabFabFr & Makerspace56