Development of Mobile Linux Open Platform

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Ideas

Emulator

- Application package (.apk)
  - Dalvik byte code (.dex)
    - Class libraries
      - CPU native code (ARMv5)
  - Dalvik VM (ARMv5)

Real Hardware

- Application package (.apk)
  - Dalvik byte code (.dex)
    - Class libraries
      - CPU native code (ARMv5)
  - Dalvik VM (ARMv5)

- Linux kernel (ARMv5 + BSP)
  - CPU native code (ARMv5)

- Linux kernel (ex. i.MX31)
  - CPU native code (ARMv5)
“It's not so difficult to just enable functions of Android using well-maintained Linux BSP!”
Real Hardwares

i.MX31 Product Development Kit

Sandgate3-P

freescale
semiconductor

Sophia systems
1. input device
2. sound
3. power management
4. telephony
“If Linux BSP supports keyboards, mice, and touch screens as input device, Android can handle those.”

**Facts:**
Android emulator supports keyboards and mice.

**Internals:**
Android watch all files under /dev/input/.
"If Linux BSP supports keyboards, mice, and touch screens as input device, Android can handle those."

**Hypothesis:**

Touch screens can be handled with event interface of input device.

**Result:**

Achieved with small modification of input driver.
If Linux BSP supports keyboards, mice, and touch screens as input device, Android can handle those.

How:

- changing X-Y coordinate
  - X, Y direction
  - resolution
- changing event type
  - EV_ABS/ABS_PRESSURE → EV_KEY/BTN_TOUCH
“If Linux BSP supports ALSA driver, Android can play musics.”

**Facts:**

Android emulator can play music on PC.
“If Linux BSP supports ALSA driver, Android can play musics.”

Hypothesis:
Power management

“If Linux BSP supports to control **CPU clock** and **backlight brightness**, power management of android can be supported.”

**Facts:**

Android provides 2 lock types

- partial wake lock
- full wake lock

Android also control backlight brightness
Power management

“If Linux BSP supports to control **CPU clock** and **backlight brightness**, power management of android can be supported.”

**Internals:**

Android operates sysfs files

- `/sys/android_power/acquire_full_wake_lock`
- `/sys/android_power/acquire_partial_wake_lock`
- `/sys/class/leds/keyboard-backlight/brightness`
- `/sys/class/leds/lcd-backlight/brightness`
- `/sys/class/leds/button-backlight/brightness`
“If Linux BSP supports to control CPU clock and backlight brightness, power management of android can be supported.”

Hypothesis:
Power management

“If Linux BSP supports to control CPU clock and backlight brightness, power management of android can be supported.”

How:

• CPU freq
  • defines 4 OPs and policies
    • 532M, 399M, 266M, 133M
  • throttle down every 3 seconds during no activities
• LCD backlight
  • become darker every 15 seconds.
Telephony

“If Linux BSP can control baseband with serial I/F, you can make a phone call with android.”

Facts:

• Android emulator supports a pseudo GSM modem device.

• There is the rild (Radio I/F Layer Daemon).
If Linux BSP can control baseband with serial I/F, you can make a phone call with android.

Hypothesis:

Android
rild
libreference-ril.so
VT
wsimd
Android modem (GSM)

Linux kernel
serial driver

Emulator
android modem (pseudo GSM)

W-SIM
(PHS)

Real Hardware

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