Using High Level View on Android Porting

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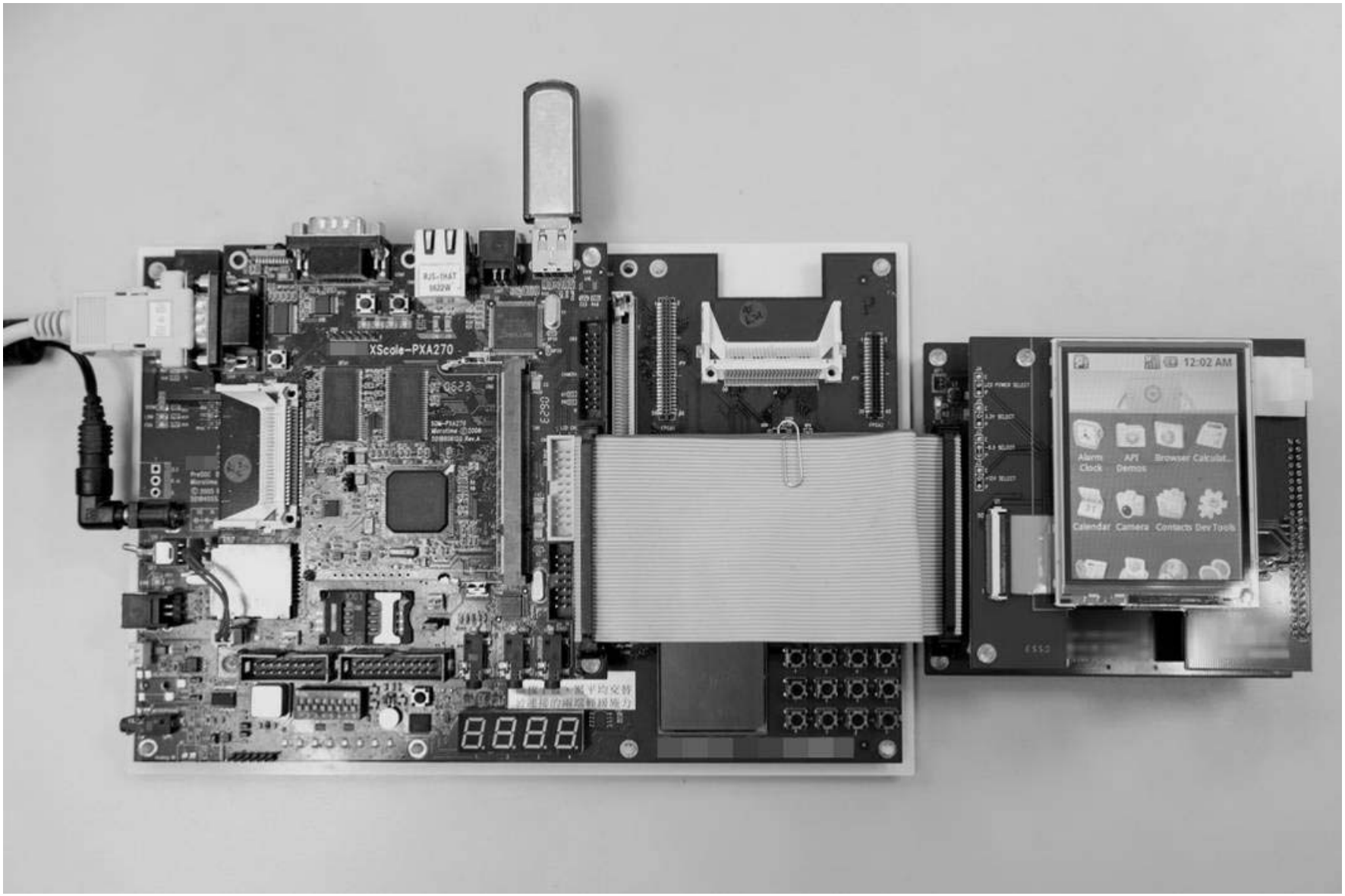
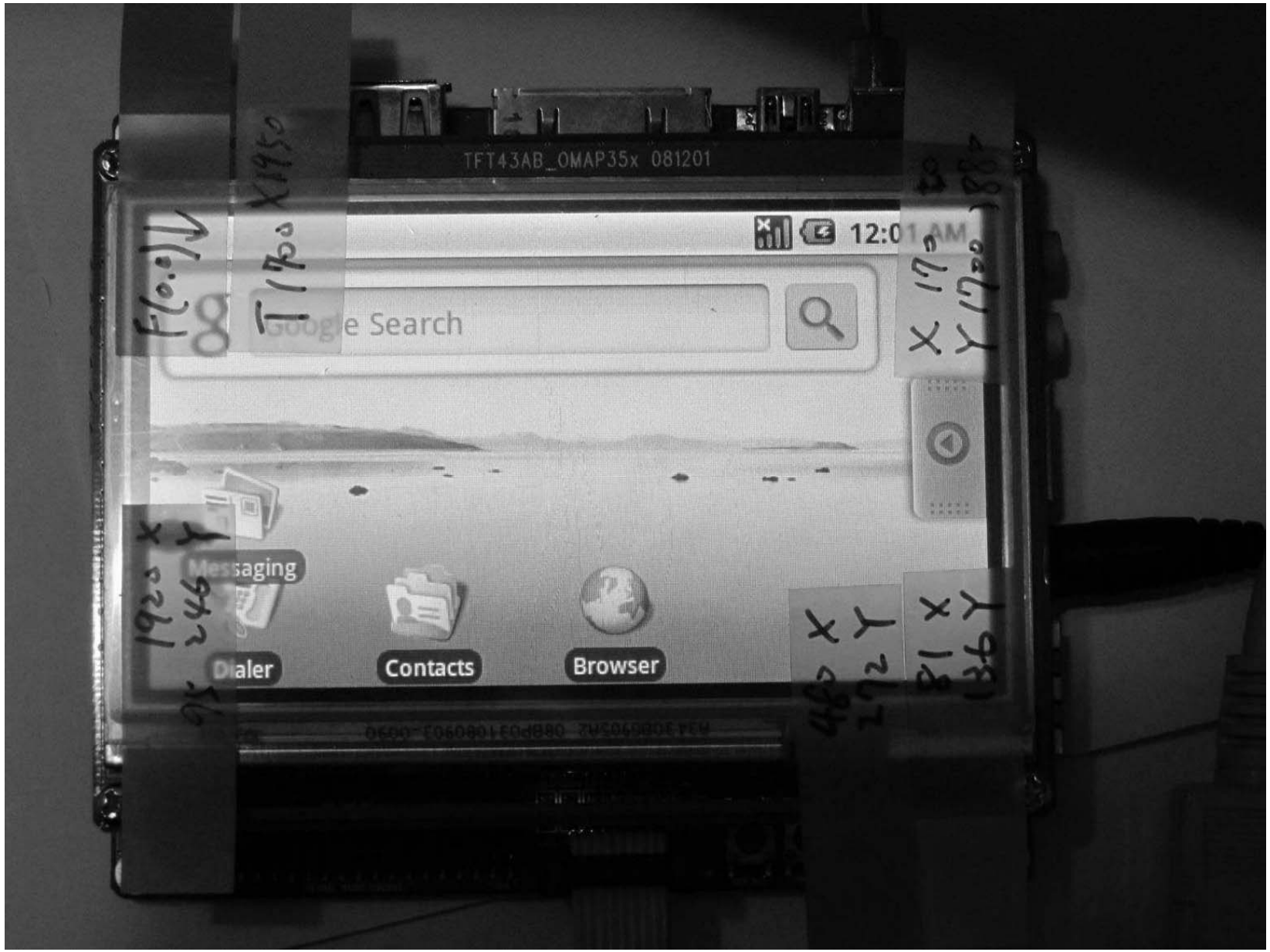
- 數年 **Linux** 及 **Embedded Linux** 相關開發經驗，開發產品包含 **Set-Top-Box**、手機及快速開機軟體等相關產品，接觸過 **x86**、**MIPS** 及 **ARM platform**，對 **Linux kernel**、**Linux device driver**、**Shared Library**、**Application** 等皆有所涉獵。
- 在 **IC** 廠完全沒有支援 **Android** 的情況下，獨立移植 **Android** 至 **PXA270**、**OMAP3530** 等硬體平台。
- 豐富的 **Android Porting** 授課經驗。

Android 1.0 on PXA270



Android 1.5 on OMAP3530



Demo

Mask 的 Andr... | Mask 的 Andr... | Synology Disk...

www.mask.org.tw/

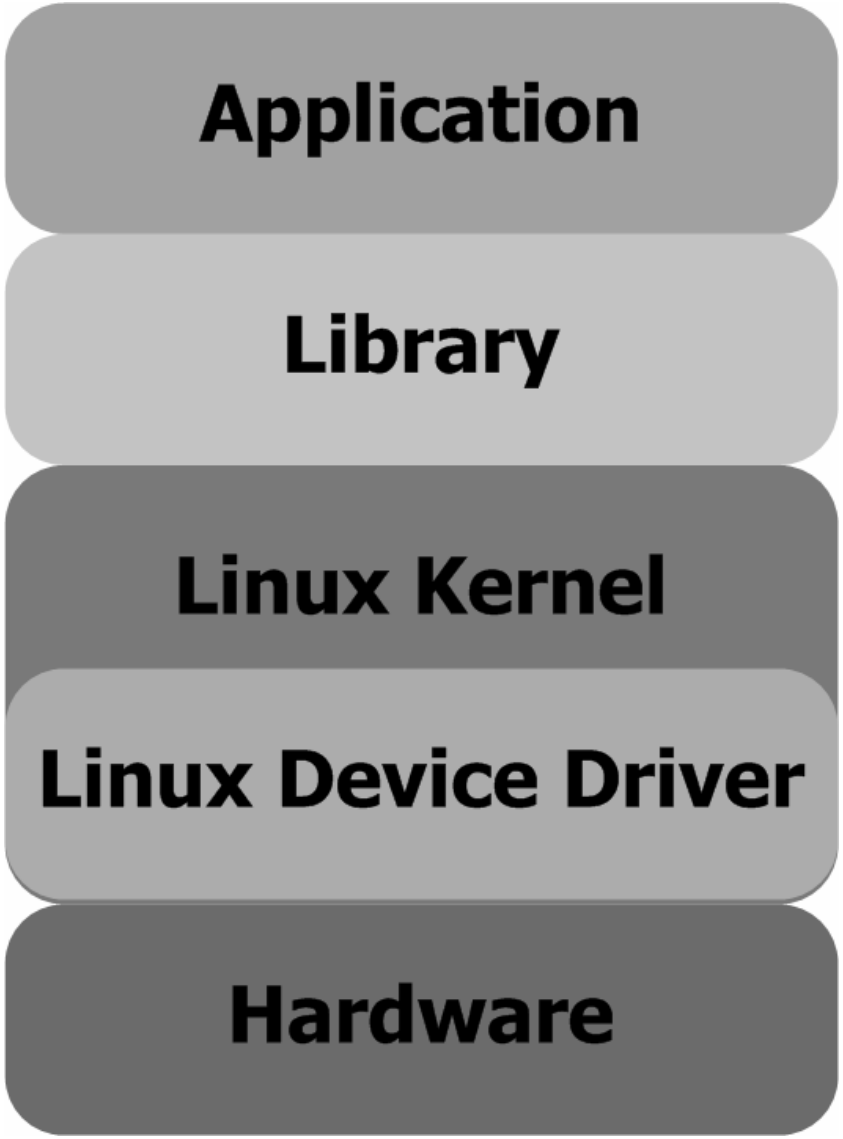
OMAP3530

2009 年 12 月首創台灣第一個上機實作 Android 移植實務課程，講授 Android 系統底層移植實務技術剖析，帶領學員實際移植 Android 至 OMAP3530. 本課程將在 IC 廠沒有提供任何 Android 相關原始碼的情況下，帶您一窺從無到有移植 Android 的奧秘. 小弟爲此課程量身打造一系列講義，工具，軟體，原始碼，開發環境以及從無到有移植 Android 的完整改版記錄，課程內容兼具理論與實務，包含移植流程說明以及實作步驟講解，課程中將讓學員親手實作移植步驟並深入了解移植細節，爲非常紮實的實作訓練課程. 學員融會貫通後，將有能力自行移植 Android 至未來的新硬體平台. 本課程絕對是台灣最高品質的 Android 移植技術與實作訓練課程. 課程中將提供開發環境及移植 Android 之完整改版記錄，相關課程請參考課程資訊.

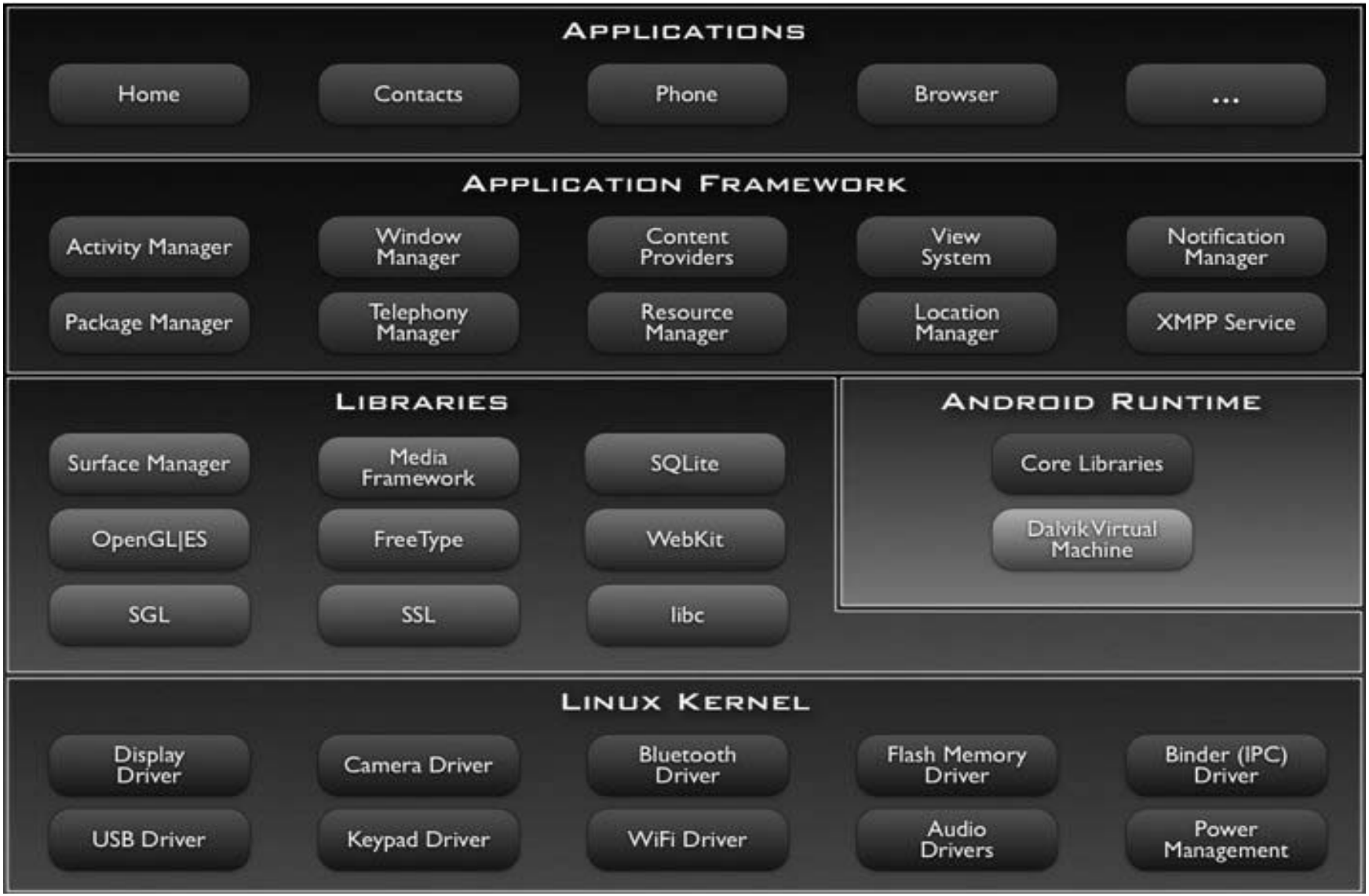
Using High Level View on Android Porting

- Linux booting procedure
- How to trace Linux kernel
- Android booting procedure
- How to trace Android source code
- Treat Android as Black Box

Embedded Linux System Architecture

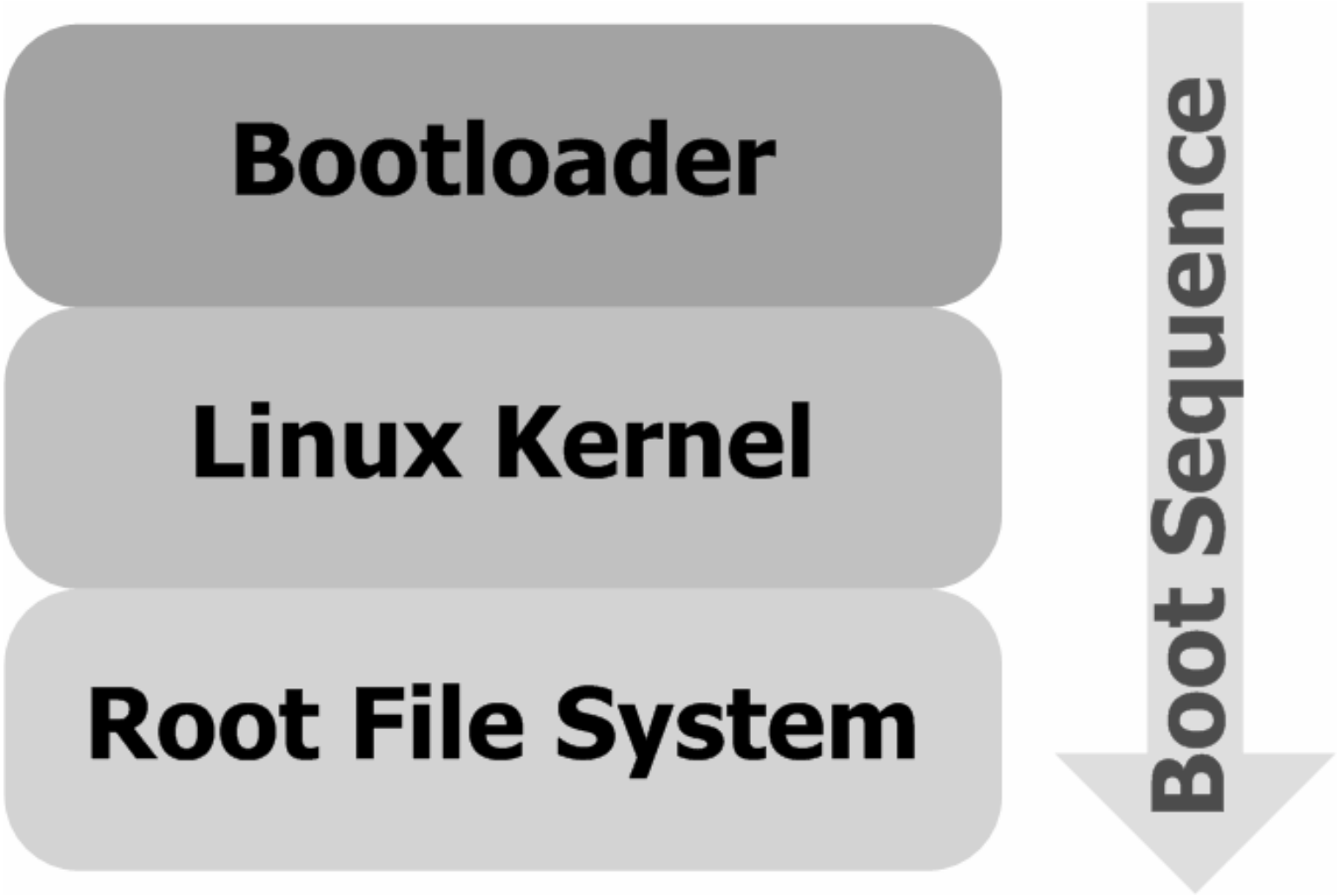


Android Architecture

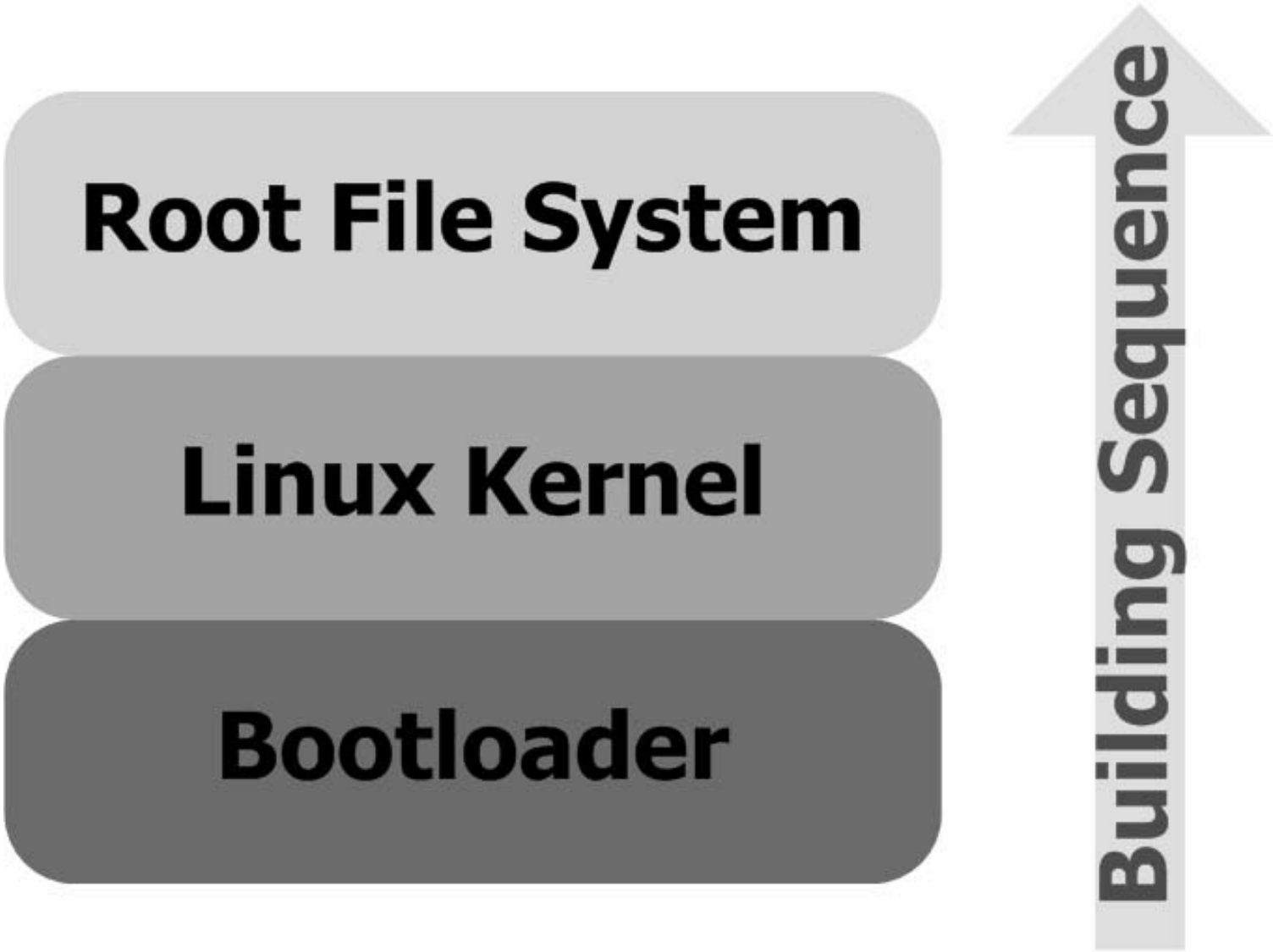


http://developer.Android.com/guide/basics/what-is-Android.html

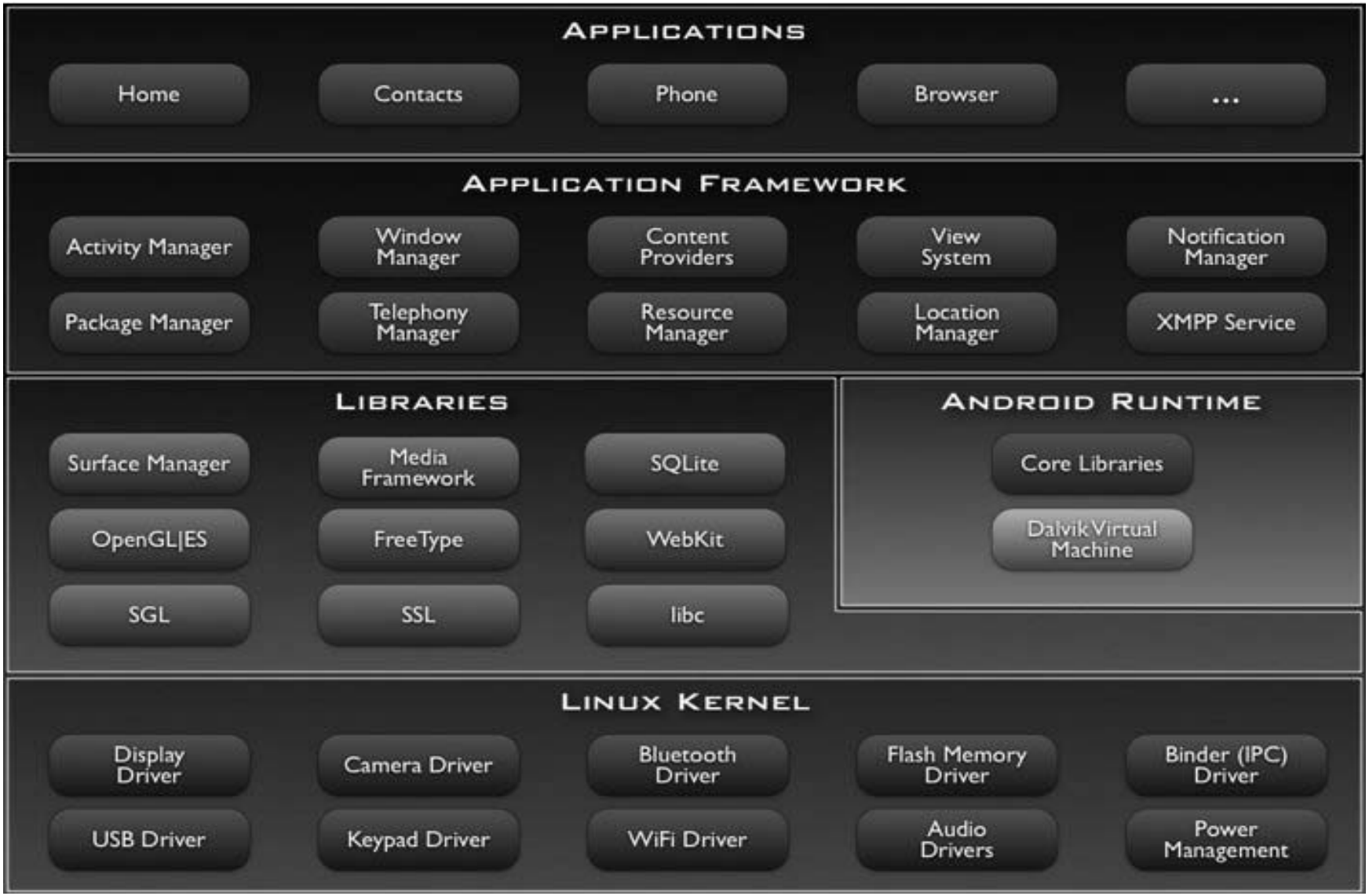
Embedded Linux System Boot Sequence



How to Construct An Embedded Linux System



Android Porting Flow



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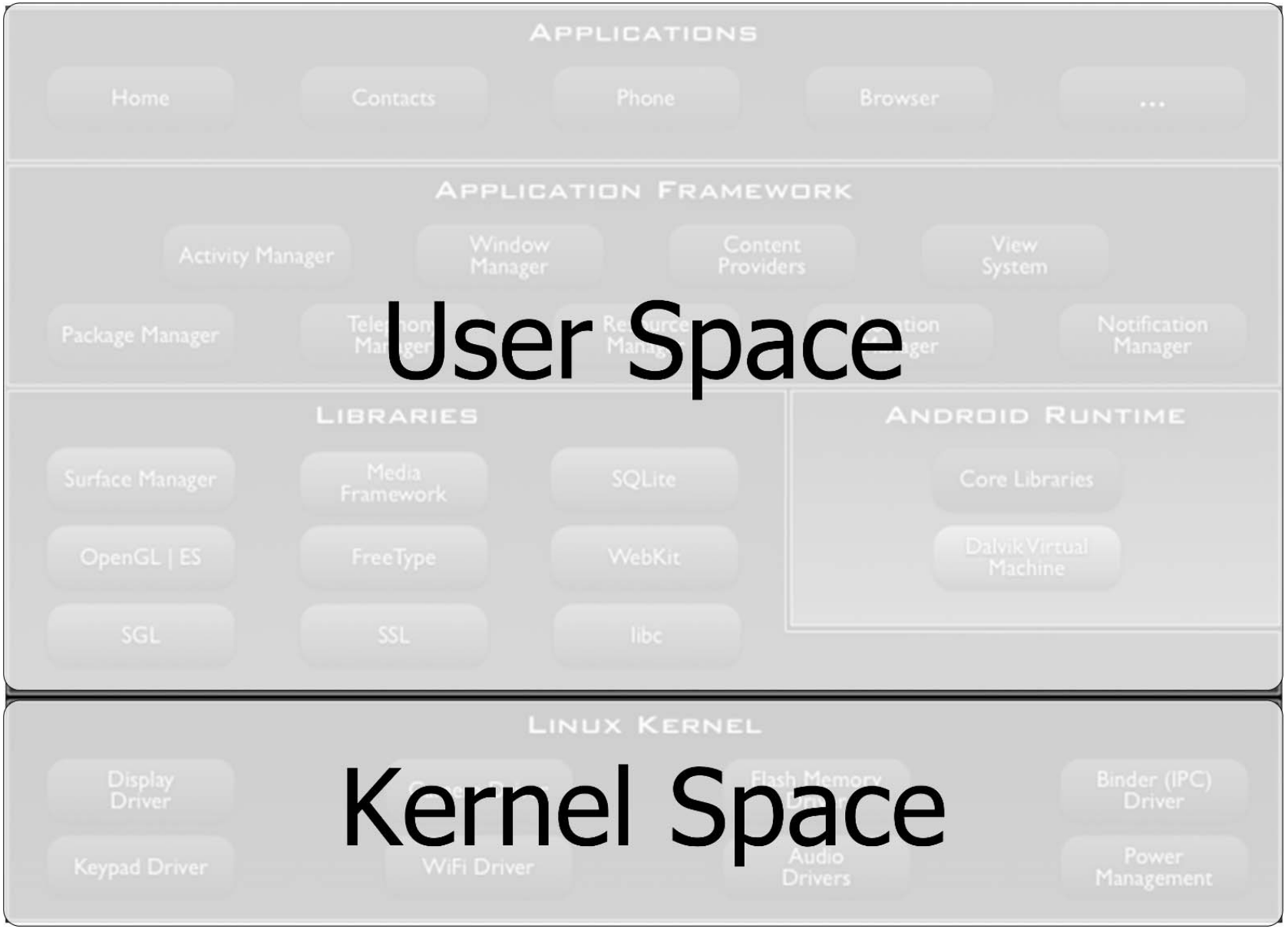
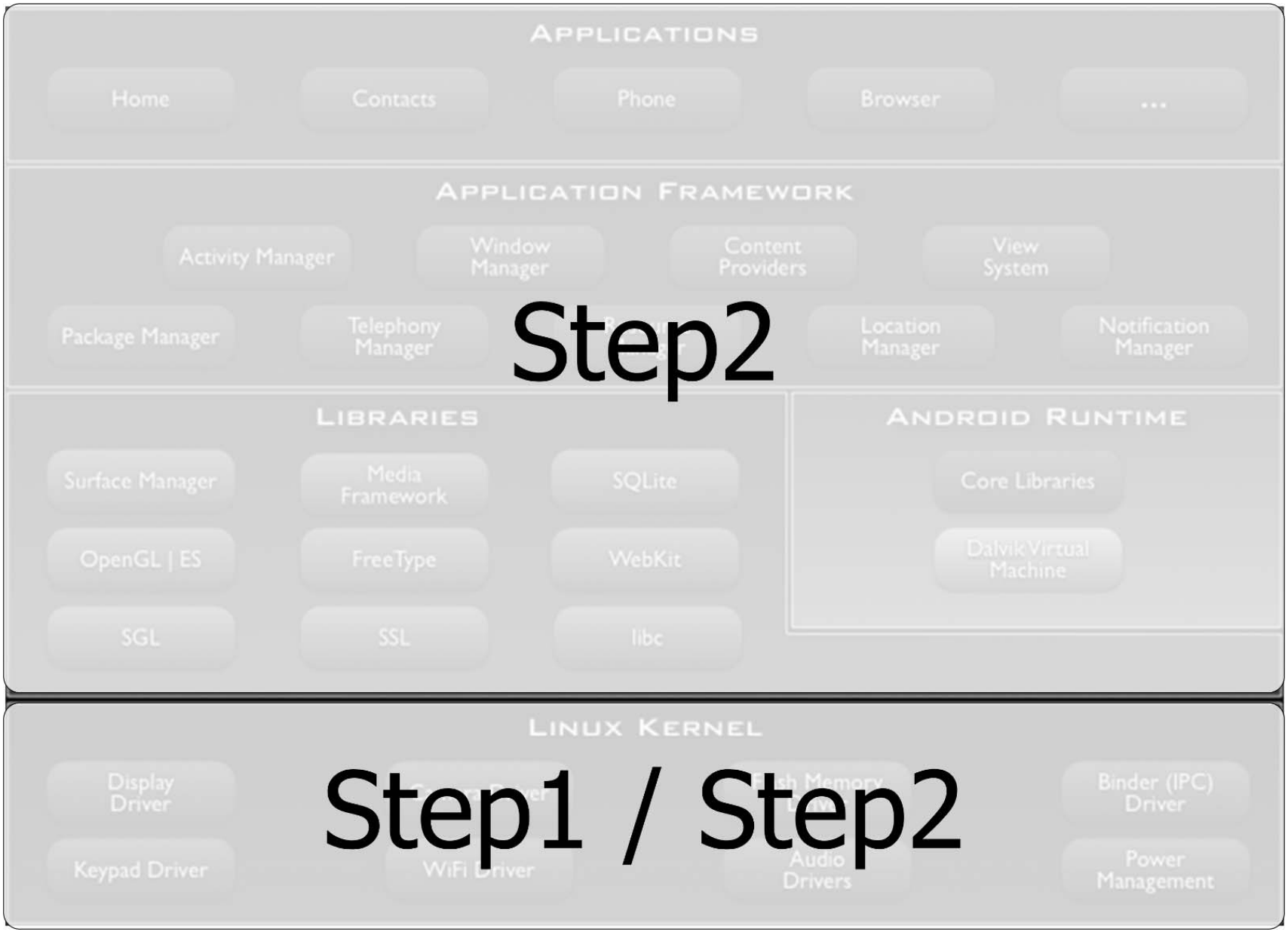
Android Porting Flow (cont)



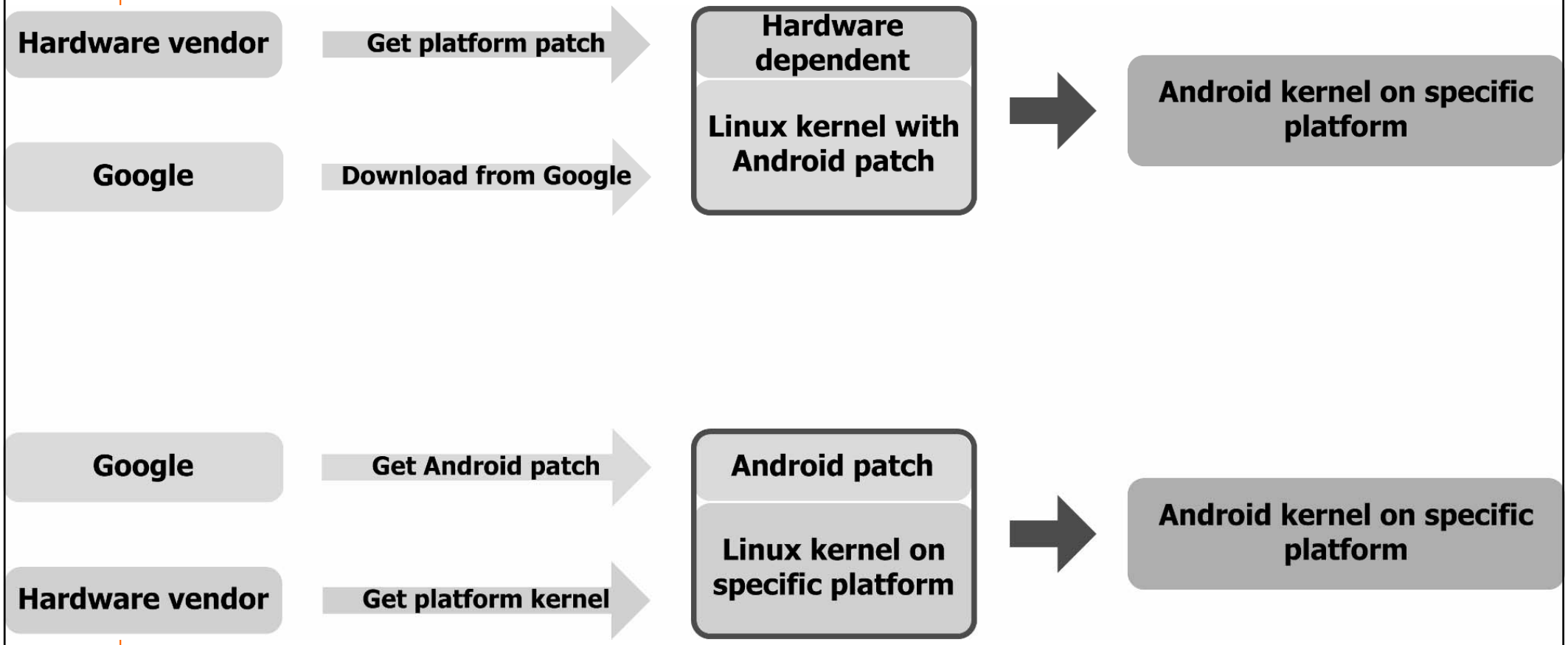
Android Porting Flow (cont)



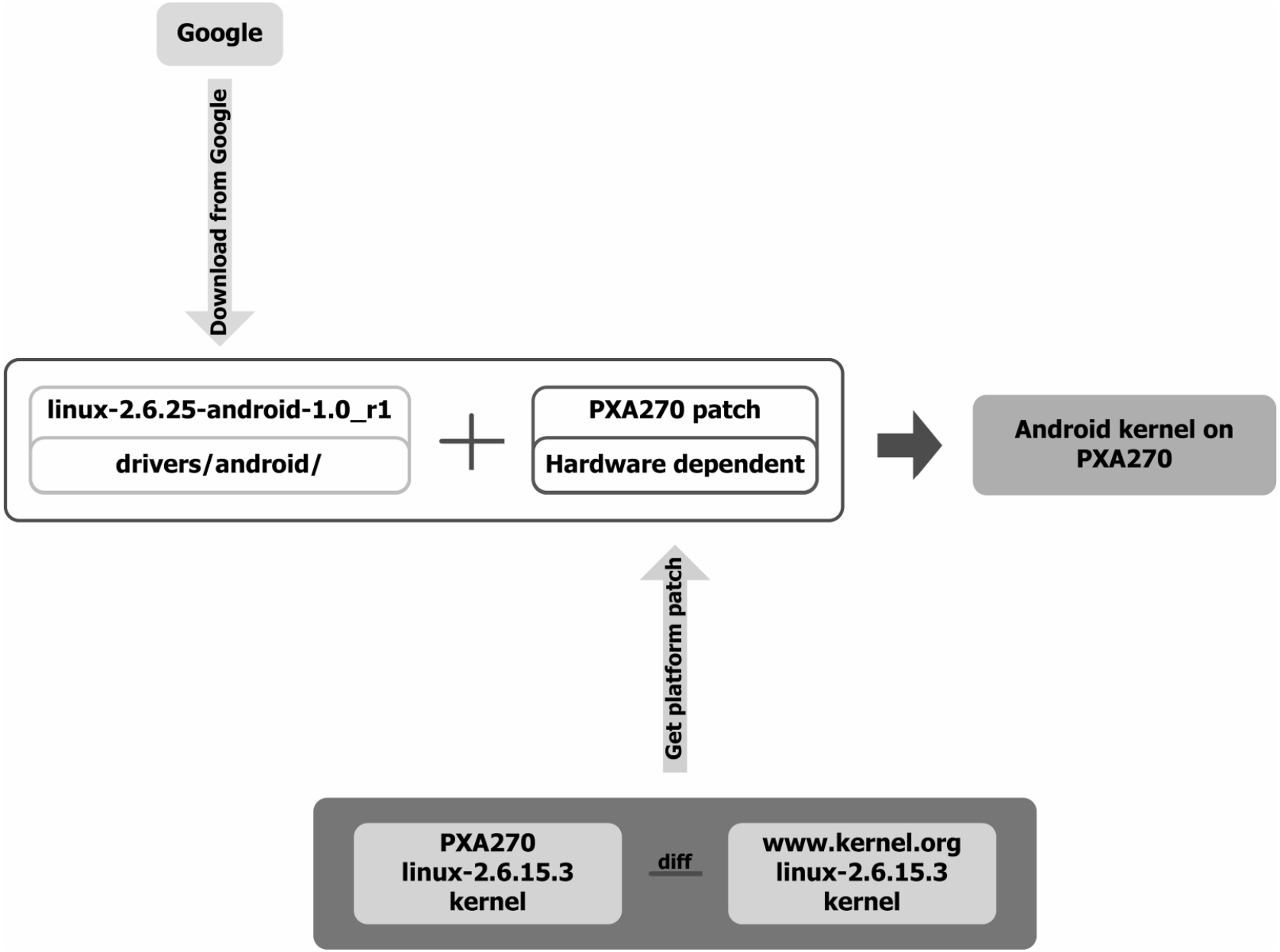
Key of Porting Android

- Complex but not difficult
  - Attitude
  - Luckiness
  - Linux system architecture
  - Software utilities
  - Experience
- Only 2 ways
  - ctags
  - Burst-force
    - find & grep

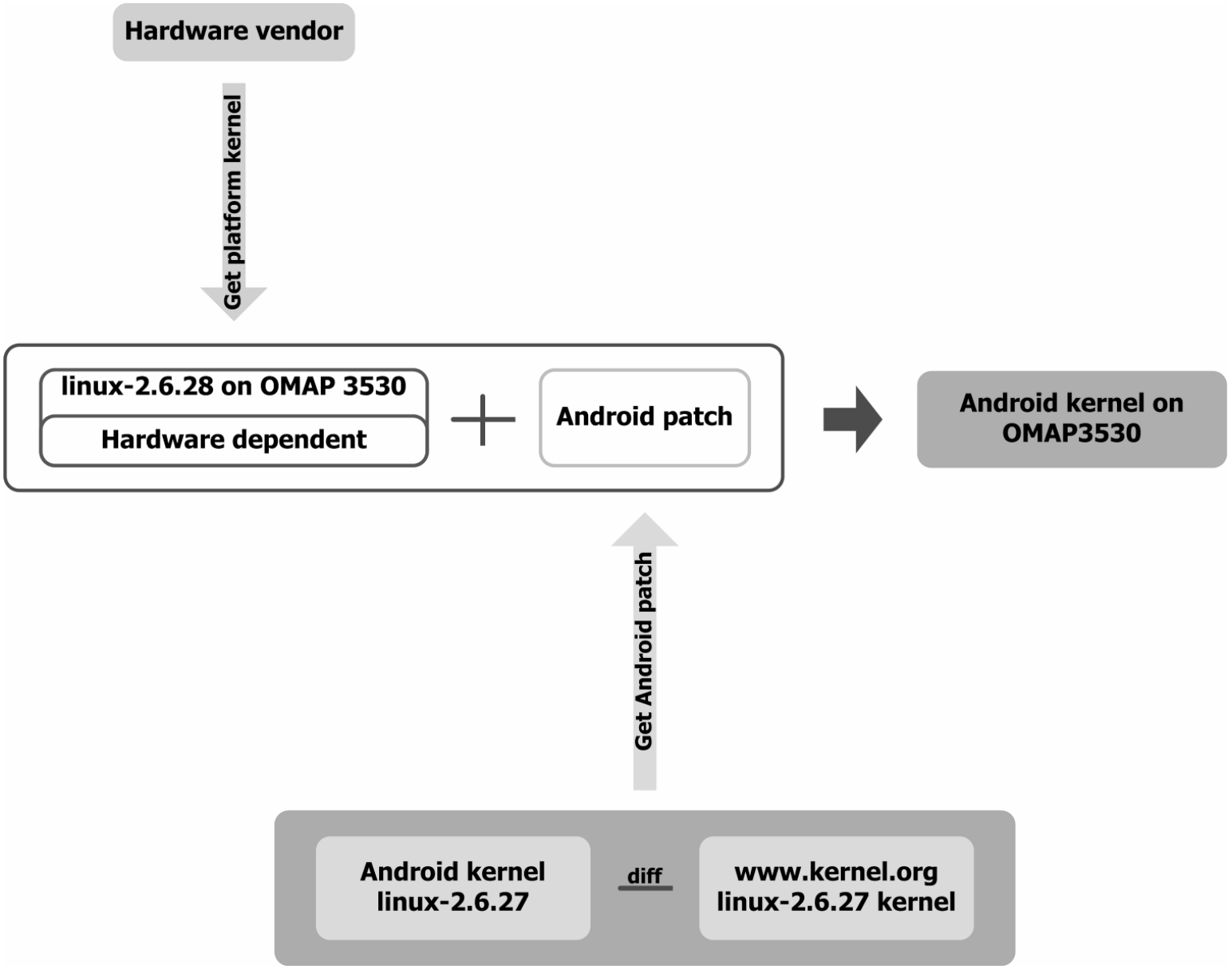
Porting Strategy of Linux Kernel for Android



Real Case on Porting Linux Kernel for Android



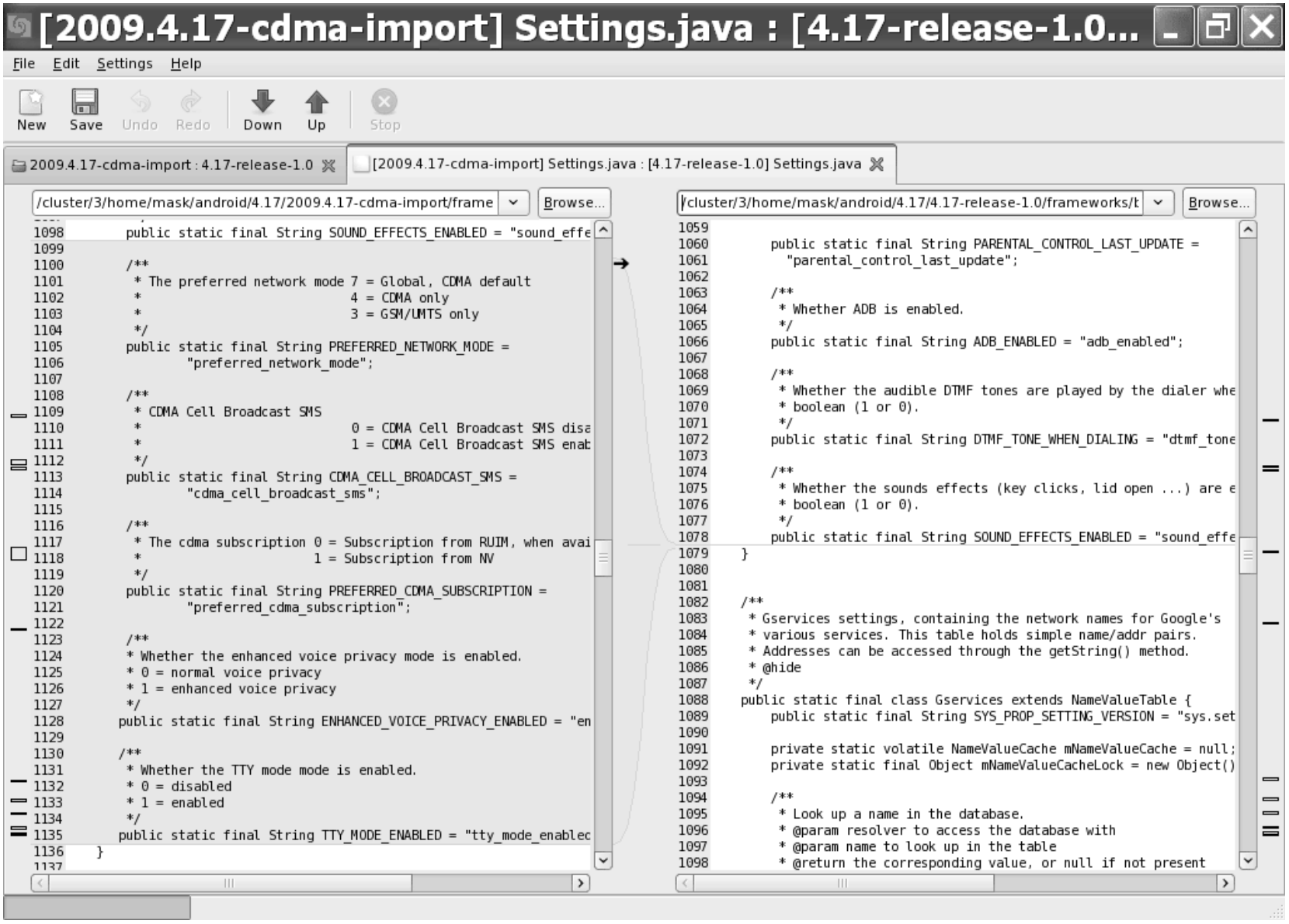
Real Case on Porting Linux Kernel for Android (cont)



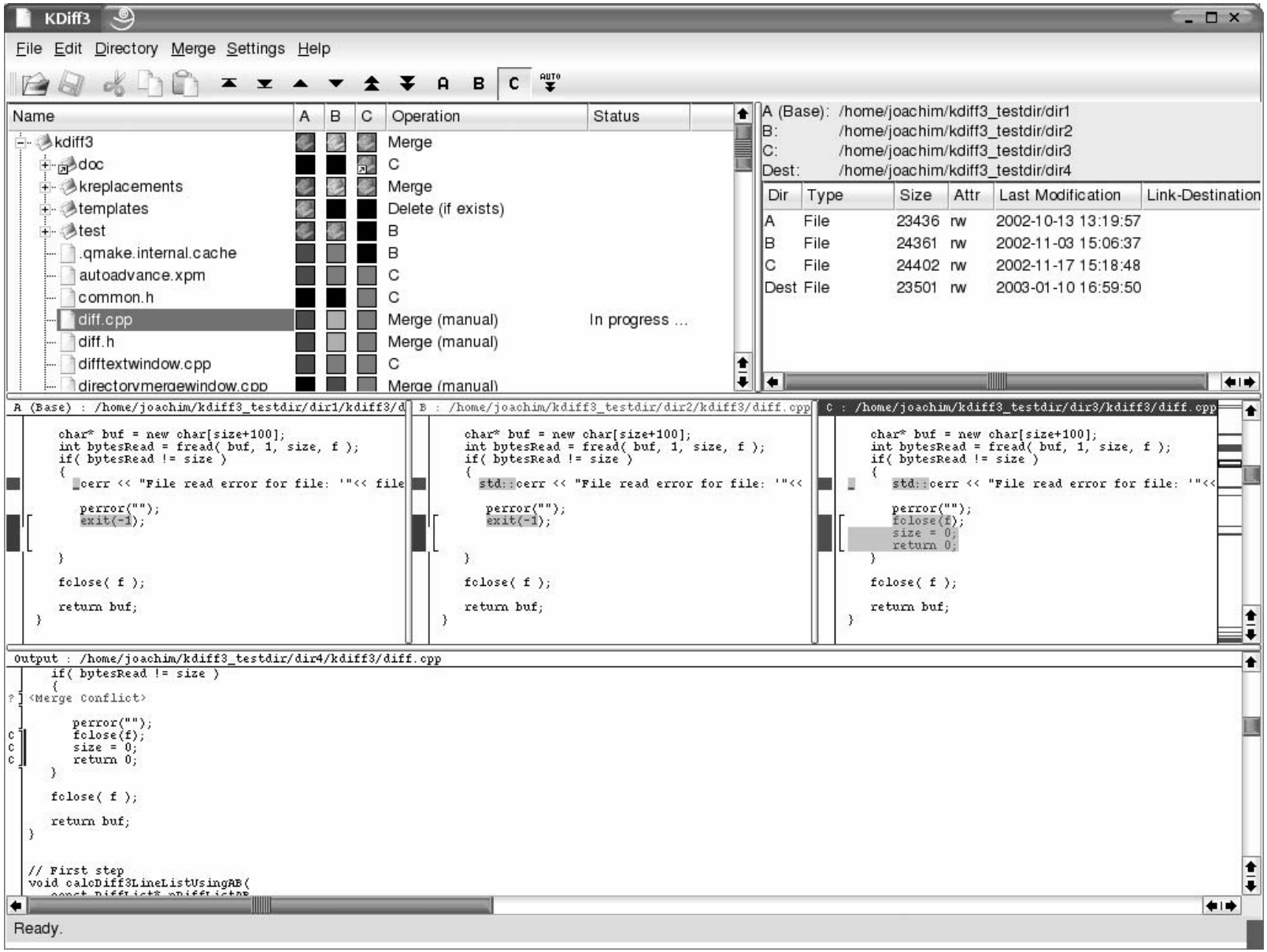
Use Tools to Port Linux Kernel for Android

- Linux platform
  - Meld
  - KDiff
- Windows platform
  - WinMerge

Meld

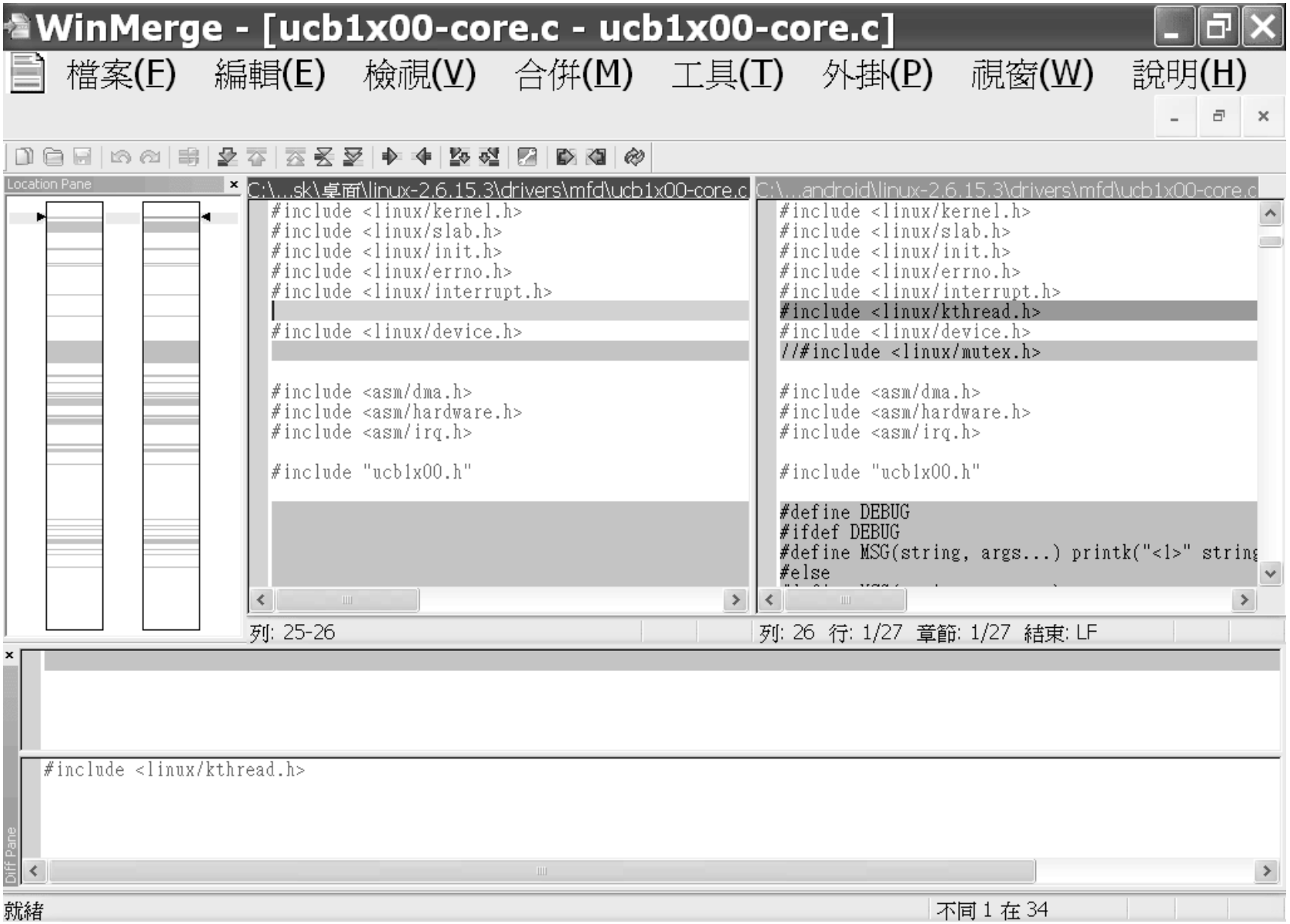


KDiff3



http://kdiff3.sourceforge.net/doc/screenshots.html

WinMerge



Potential Problems on Porting Linux Kernel

- Data structure
  - Reference similar platforms
  - Reference multiple versions of Linux kernel
- Init section
  - Reference successfully compiled drivers
- Source dispersed
  - Only consider the BSP changed from the official Linux kernel
- File name changed
  - Same as the previous item

Android Booting Procedure

- system/core/init/init.c (/init)
- /init.rc
- Daemons
  - adbd
  - rild
  - ...
- Zygote
- Service Manager
- System Service

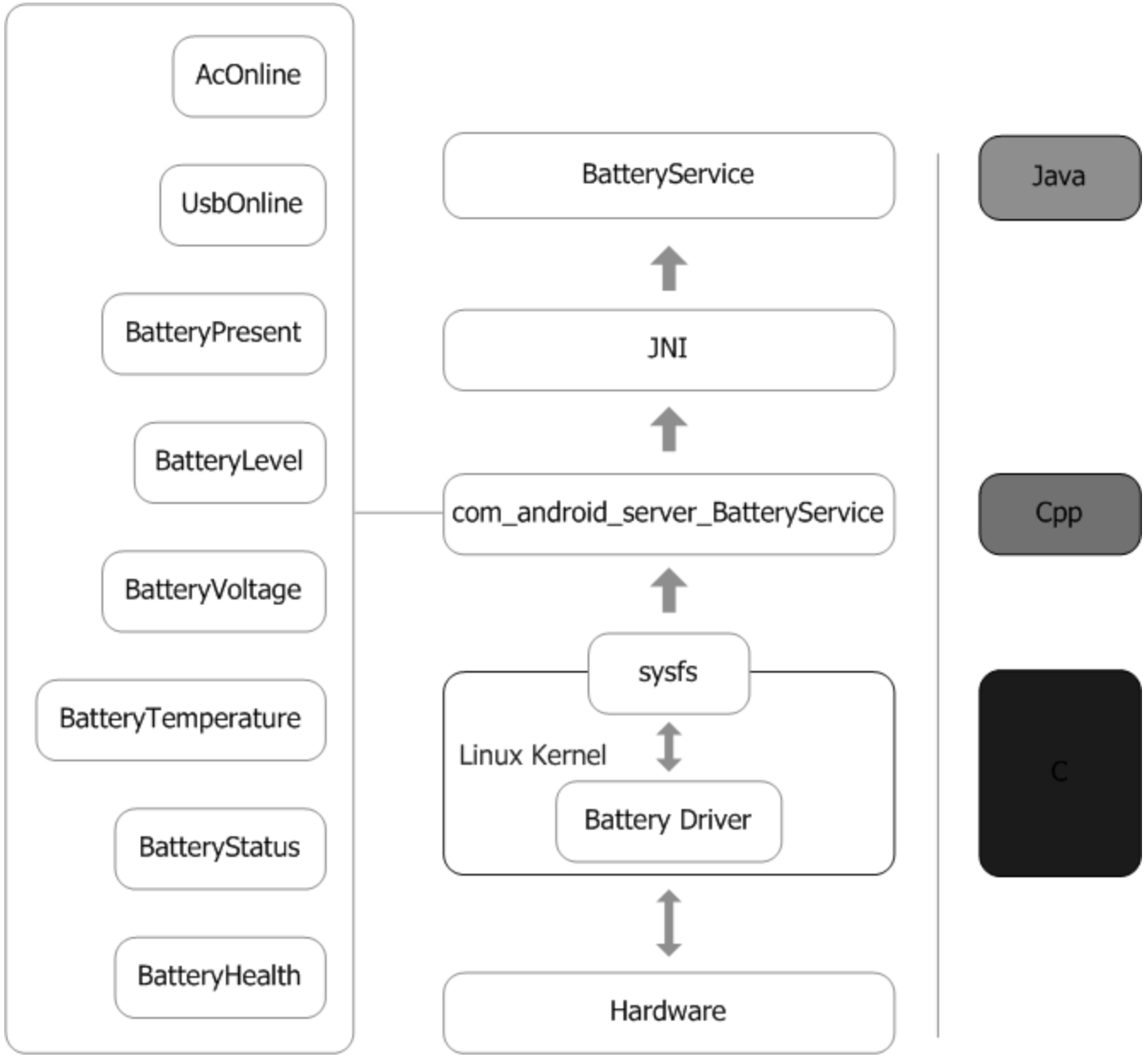
How to Trace Android Source Code

- ctags --C++-kinds=+p -R

Logcat

```
E/EventHub( 1589): could not get driver version for /dev/input/mouse0
I/EventHub( 1589): New device: path=/dev/input/event0 name=android-ke
I/SystemServer( 1589): Starting Bluetooth Service.
I/EventHub( 1589): New keyboard: publicID=65537 device->id=65537 devn
I/SystemServer( 1589): Starting Status Bar Service.
E/EventHub( 1589): could not get driver version for /dev/input/mice,
I/KeyInputQueue( 1589): Device added: id=0x0, name=android-keypad, cl
I/KeyInputQueue( 1589): Device added: id=0x10000, name=null, classes=
I/KeyInputQueue( 1589):   X: min=0 max=920 flat=0 fuzz=0
I/KeyInputQueue( 1589):   Y: min=0 max=950 flat=0 fuzz=0
I/KeyInputQueue( 1589):   Pressure: min=0 max=1 flat=0 fuzz=0
I/KeyInputQueue( 1589):   Size: unknown values
I/KeyInputQueue( 1589): absX=com.android.server.InputDevice$AbsoluteI
I/KeyInputQueue( 1589): absY=com.android.server.InputDevice$AbsoluteI
I/KeyInputQueue( 1589): absPressure=com.android.server.InputDevice$Ab
I/KeyInputQueue( 1589): absSize=null
I/foo     ( 1589): ***** HAVE TOUCHSCREEN!
I/WindowManager( 1589): Input configuration changed: { scale=1.0 imsi
D/dalvikvm( 1589): GC freed 11328 objects / 708880 bytes in 162ms
I/SystemServer( 1589): Starting Hardware Service.
I/SystemServer( 1589): Starting NetStat Service.
I/SystemServer( 1589): Starting Connectivity Service.
```

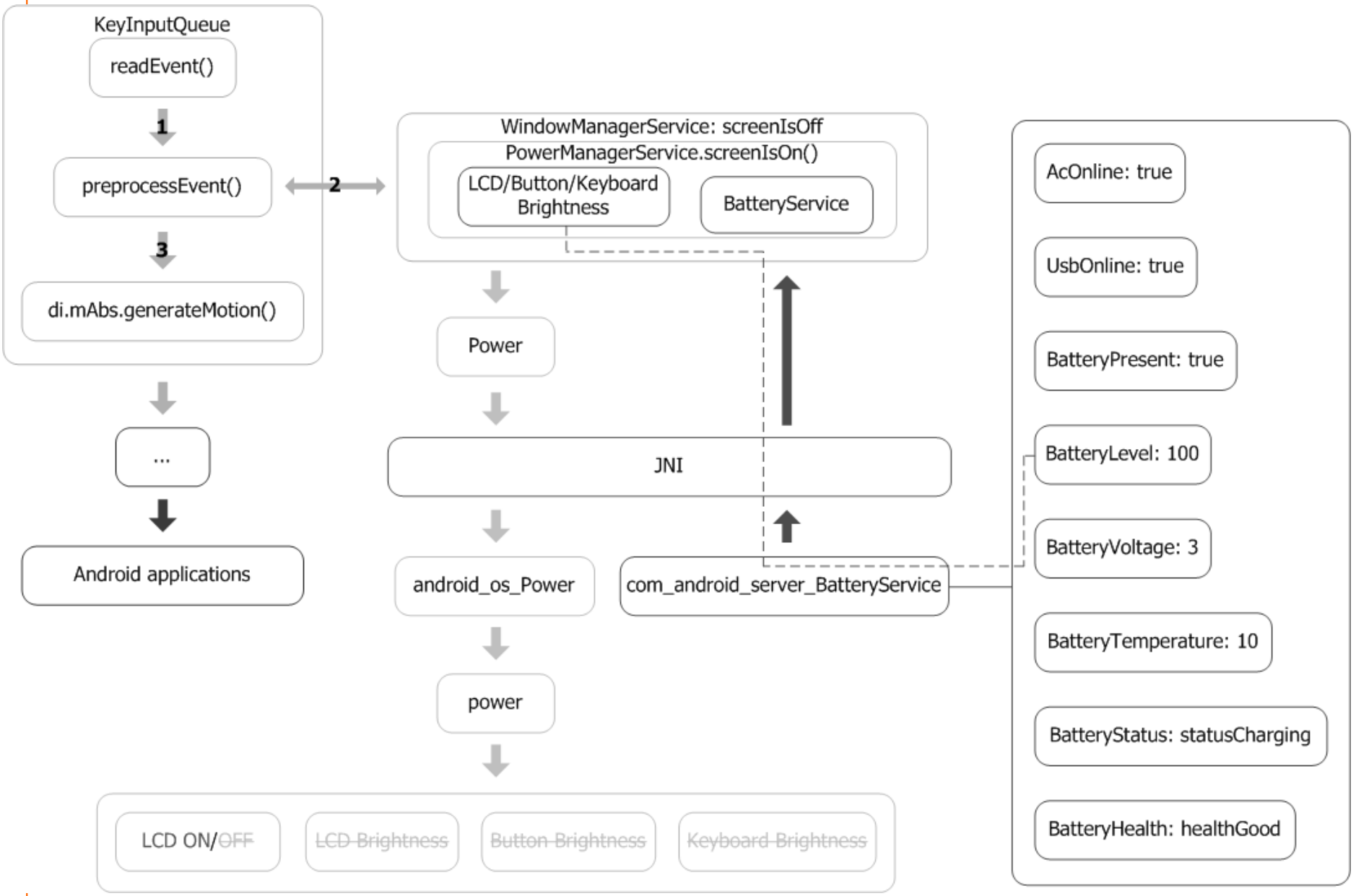
Android BatteryService Workflow



Battery Driver

- Battery Driver creates the following sysfs entries
  - /sys/class/power_supply/ac/online
  - /sys/class/power_supply/usb/online
  - /sys/class/power_supply/battery/status
  - /sys/class/power_supply/battery/health
  - /sys/class/power_supply/battery/present
  - /sys/class/power_supply/battery/capacity
  - /sys/class/power_supply/battery/batt_vol
  - /sys/class/power_supply/battery/batt_temp
  - /sys/class/power_supply/battery/technology

Relationship between Input Keys and Android Services



Q & A