

Android Wave Is Not Google Wave

A little 3D

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Outline

關於我

libEGL and libGLESv1_CM

libagl

libhgl

GEM and KMS

3D and Me

- ▶ 不會OpenGL
- ▶ 不會演算法
- ▶ 不會硬體
- ▶ 不會驅動程式
- ▶ 沒有在玩3D 遊戲

Who am I?

- ▶ Oxlab 成員
- ▶ 數學系畢業

Hurry Porter

- ▶ 把Intel DRI 驅動程式移植到Android

Outline

關於我

libEGL and libGLESv1_CM

libagl

libhgl

GEM and KMS

libGL ESv1_CM

- ▶ frameworks/base/opengl/libs/GLES_CM/
- ▶ OpenGL ES API
- ▶ Entry points

```
void glClear(void) {  
    gl_hooks_t::gl_t const * const _c =  
        &getGLThreadSpecific()->gl;  
    return _c->glClear();  
}
```

libEGL

- ▶ `frameworks/base/opengl/libs/EGL/`
- ▶ `dlopen libagl` 跟 `libhgl`
- ▶ `libagl` 提供軟體實作
- ▶ `libhgl` 提供硬體實作

身為libhgl

- ▶ Android 傳過來的是egl_native_window_t

身為libhgl

- ▶ Android 傳過來的是egl_native_window_t
- ▶ egl_native_window_t 是EGLNativeWindowSurface

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- ▶ EGLNativeWindowSurface 是Surface

身為libhgl

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- ▶ EGLNativeWindowSurface 是Surface
- ▶ Surface 是...

Surface

- ▶ Surface 是buffer

硬體

- ▶ 硬體要的也是buffer

硬體

- ▶ 硬體要的也是buffer
- ▶ 放座標

硬體

- ▶ 硬體要的也是buffer
- ▶ 放座標
- ▶ 放材質

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- ▶ 放shader

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- ▶ 放硬體指令

硬體

- ▶ 硬體要的也是buffer
- ▶ 放座標
- ▶ 放材質
- ▶ 放shader
- ▶ 放硬體指令
- ▶ 但是...

硬體限制

- ▶ 硬體要的是它能存取的buffer

- ▶ a.k.a GEM Object
- ▶ 讓Android 產生GEM object based Surface

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libEGL and libGLESv1_CM

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GEM and KMS

GEM in CPU

- ▶ GEM object 只是shared memory (man shmget(2))
- ▶ X server 配置
- ▶ 應用程式繪圖
- ▶ compiz 合成
- ▶ 跨process!

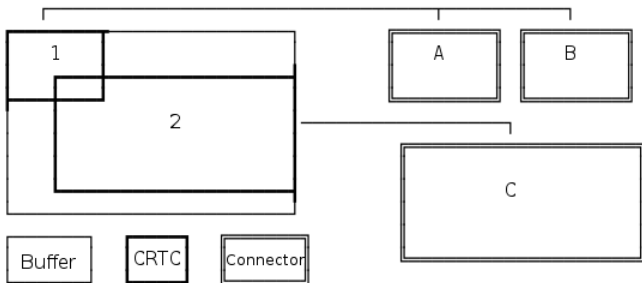
GEM in GPU

- ▶ 映射到AGP aperture
- ▶ CPU cache
- ▶ GPU cache

KMS

- ▶ Kernel Mode Setting
- ▶ 叫kernel 做解晰度設定

KMS



```
int drmModeSetCrtc(int fd,  
                  uint32_t crtclId,  
                  uint32_t bufferId,  
                  uint32_t x, uint32_t y,  
                  uint32_t *connectors, int count,  
                  drmModeModelInfoPtr mode);
```

<http://gitorious.org/android-eeepc/pages/Home>

Q & A

Questions?