DRM HW Composer for Beagle x15 Board

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What is that about?

- Why do we do this and what are we trying to achieve
- The initial device configuration
- Enable the external/drm_hwcomposer to be launched on the board
- Implement the buffer Importer
- Problems and solutions
What is the goal?

WindowManager
SurfaceFlinger
hwcomposer
gralloc

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The initial configuration

Android Q

Beagle x15 Board

Kernel 4.14

SurfaceFlinger

HWC2On1Adapter

hwcomposer.am57x

gralloc.am57x

vendor-specific graphics modules
Launch the drm hwc on the board

Step 1: replace existing hwcomposer with the drm hwc.

```diff
diff --git a/device.mk b/device.mk
+BOARD_USES_DRM_HWCOMPOSER := true

PRODUCT_PACKAGES += \
- hwcomposer.am57x \
+ hwcomposer.drm \

diff --git a/init.beagle_x15board.rc b/init.beagle_x15board.rc
+on post-fs
+ setprop ro.hardware.hwcomposer drm
```
Launch the drm hwc on the board

```
03-21 13:47:11.889 220 220 E HWComposer: presentAndGetReleaseFences: present failed for display 0: NoResources (6)
03-21 13:47:11.905 212 212 E hwc-platform-drm-generic: could not create drm fb -22
03-21 13:47:11.905 212 212 E hwc-drm-two: Failed to import layer, ret=-22
03-21 13:47:11.905 220 220 E HWComposer: presentAndGetReleaseFences: present failed for display 0: NoResources (6)
03-21 13:47:11.920 212 212 E hwc-platform-drm-generic: Cannot convert hal format to drm format 2816
03-21 13:47:11.920 212 212 E hwc-platform-drm-generic: Cannot convert hal format 4294967274 to bpp (returning 32)
03-21 13:47:11.920 212 212 E hwc-platform-drm-generic: could not create drm fb -22
03-21 13:47:11.920 212 212 E hwc-drm-two: Failed to import layer, ret=-22
03-21 13:47:11.921 212 212 E hwc-platform-drm-generic: Cannot convert hal format to drm format 6656
03-21 13:47:11.921 212 212 E hwc-platform-drm-generic: Cannot convert hal format 4294967274 to bpp (returning 32)
03-21 13:47:11.921 212 212 E hwc-platform-drm-generic: could not create drm fb -22
03-21 13:47:11.921 212 212 E hwc-drm-two: Failed to import layer, ret=-22
03-21 13:47:11.921 220 220 E HWComposer: presentAndGetReleaseFences: present failed for display 0: NoResources (6)
03-21 13:47:11.937 212 212 E hwc-platform-drm-generic: Cannot convert hal format to drm format 2816
03-21 13:47:11.937 212 212 E hwc-platform-drm-generic: Cannot convert hal format 4294967274 to bpp (returning 32)
03-21 13:47:11.937 212 212 E hwc-platform-drm-generic: could not create drm fb -22
03-21 13:47:11.937 212 212 E hwc-drm-two: Failed to import layer, ret=-22
03-21 13:47:11.938 212 212 E hwc-platform-drm-generic: Cannot convert hal format to drm format 6656
```
Add the buffer Importer class implementation

The Importer structure in `external/drm_hwcomposer`:

```c
platform.h
platform.cpp}    class Importer (pure virtual base class)
```

```c
platformdrmgeneric.h
platformdrmgeneric.cpp}    class DrmGenericImporter : public Importer
```

```c
platformhisi.h
platformhisi.cpp}    class HisiImporter : public DrmGenericImporter
```

```c
platformminigbm.h
platformminigbm.cpp}    class DrmMinigbmImporter : public DrmGenericImporter
```
Add the buffer Importer class implementation

`external/drm_hwcomposer/platformdrmgeneric.h`:
```cpp
class DrmGenericImporter : public Importer {
public:
    DrmGenericImporter(DrmDevice *drm);
    ~DrmGenericImporter() override;
    int Init();
    int ImportBuffer(buffer_handle_t handle, hwc_drm_bo_t *bo) override;
    int ReleaseBuffer(hwc_drm_bo_t *bo) override;
    bool CanImportBuffer(buffer_handle_t handle) override;
    uint32_t ConvertHalFormatToDrm(uint32_t hal_format);
    uint32_t DrmFormatToBitsPerPixel(uint32_t drm_format);
private:
    DrmDevice *drm_;
    const gralloc_module_t *gralloc_;}
```

Implemented in the `platformdrmgeneric.cpp`
Add the buffer Importer class implementation

The int ImportBuffer(buffer_handle_t handle, hwc_drm_bo_t *bo) function converts buffer_handle_t to the hwc_drm_bo_t:
Add the buffer Importer class implementation

```
external/drm_hwcomposer/Android.mk:
ifeq ($(TARGET_PRODUCT),hikey960)
LOCAL_CPPFLAGS += -DUSE_HISI_IMPORTER
LOCAL_SRC_FILES += platformhisi.cpp
LOCAL_C_INCLUDES += device/linaro/hikey/gralloc960/
else ifeq ($(TARGET_PRODUCT),hikey)
LOCAL_CPPFLAGS += -DUSE_HISI_IMPORTER
LOCAL_SRC_FILES += platformhisi.cpp
LOCAL_C_INCLUDES += device/linaro/hikey/gralloc/
else ifeq ($(strip $(BOARD_DRM_HWCOMPOSER_BUFFER_IMPORTER)),minigbm)
LOCAL_SRC_FILES += platformminigbm.cpp
LOCAL_C_INCLUDES += external/minigbm/cros_gralloc/
else
LOCAL_CPPFLAGS += -DUSE_DRM_GENERIC_IMPORTER
endif
```
Add the buffer Importer class implementation

diff --git a/Android.mk b/Android.mk
index d5ee200..d4907d1 100644
--- a/Android.mk
+++ b/Android.mk
@@ -90,6 +90,9 @@ ifeq ($(TARGET_PRODUCT),hikey960)
 LOCAL CPPFLAGS += -DUSE_HISI_IMPORTER
 LOCAL SRC_FILES += platformhisi.cpp
 LOCAL C INCLUDES += device/linaro/hikey/gralloc960/
+else ifeq ($(TARGET_PRODUCT),beagle_x15)
+LOCAL C INCLUDES += hardware/ti/am57x/gralloc/include/
+LOCAL SRC_FILES += platformimagination.cpp
 else ifeq ($(TARGET PRODUCT),hikey)
 LOCAL CPPFLAGS += -DUSE_HISI_IMPORTER
 LOCAL SRC_FILES += platformhisi.cpp
Possible problems

Image bouncing on HDMI display. Captured in slow motion.

Cause:
Interlaced mode is used by Android after probing the display.

Solution:
Delist interlaced modes if not needed. Under investigation.
Possible problems

A display is not working as a primary display.

Possible cause: the display type is not supported as internal or external display in dem_hwc.

How to check: the drmconnector.cpp file contains the DrmConnector class. The function internal() an external() are containing supported display types. If your display type is not in the list - it won’t work.

Solution: add required display type to the list of supported, regarding the display role.
Possible problems

Single display is not working as an external display.

Possible cause: under investigation

Solution: under investigation
Questions?