Rockchip Buildroot Weston Developer Guide

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Preface

Overview

This document presents the basic configuration methods of Buildroot SDK Weston display service.

Product Version

Chipset	Kernel Version
All chipset	4.4

Intended Audience

This document (this guide) is mainly intended for:

Technical support engineers
Software development engineers

Revision History

Version	Author	Date	Revision History
V1.0.0	Jeffy Chen	2019-11-27	Initial version
V1.0.1	Ruby Zhang	2020-07-23	Update the company name and the format of the document
V1.1.0	Jeffy Chen	2020-08-04	Update contents for the newest SDK
V1.2.0	Jeffy Chen	2020-09-25	Update contents for the newest SDK

Contents

1. Introduction

1.1 Overview

Weston is the official implementation reference of Wayland open source display protocol, and Weston 8.0 drm back-end is used in Rockchip Buildroot SDK by default.

1.2 Configuration Methods

There are multiple ways to configure Rockchip Buildroot SDK Weston:

a. Command line options

That is, the options of the command when starting Weston, such as weston --tty=2.

b. weston.ini configuration file

It's located in /etc/xdg/weston/weston.ini, corresponding to the location of SDK code: buildroot/board/rockchip/common/base/etc/xdg/weston/weston.ini.

Please refer to: https://fossies.org/linux/weston/man/weston.ini.man.

c. Special environment variables

Generally, these environment variables are set in these places:

1. The startup script of Weston, which is located in /etc/init.d/S50launcher of the SDK firmware, for example:

```
    # /etc/init.d/S50launcher
      start)
                    ...
                    export WESTON_DRM_MIRROR=1 # should be set before starting weston
                    ...
                    weston --tty=2 -B=drm-backend.so --idle-time=0&
```

2. The environment script of Weston, which is located in /etc/profile.d/weston.sh of the SDK firmware.

d. Dynamic configuration file

For drm back-end, Buildroot SDK Weston provides some dynamic configuration support, such as dynamic display configuration files, the default path is /tmp/.weston_drm.conf, which can be specified by the environment variable WESTON_DRM_CONFIG.

e. udev rules

Part of the configurations of input devices in Weston should be set by `udev rules`.

2. Configuration

2.1 Status Bar Configuration

Weston supports setting the background color and position of status bar in the `shell` section of weston.ini configuration file, and setting the quick start program in the `launcher` section, for example:

```
# /etc/xdg/weston/weston.ini

[shell]
panel-color=0x90ff0000
# the color format is ARGB8888

panel-position=bottom
# top|bottom|left|right|none,none is disable

[launcher]
icon=/usr/share/icons/gnome/24x24/apps/utilities-terminal.png
# icon path

path=/usr/bin/gnome-terminal
# quick start command
```

Currently, Weston does not support setting the size of status bar. You have to modify in the code level when need some adjustments:

```
// weston-8.0.0/clients/desktop-shell.c

static void
panel_configure(void *data,
                struct weston_desktop_shell *desktop_shell,
                uint32_t edges, struct window *window,
                int32_t width, int32_t height)
{
        ...
        switch (desktop->panel_position) {
        case WESTON_DESKTOP_SHELL_PANEL_POSITION_TOP:
        case WESTON_DESKTOP_SHELL_PANEL_POSITION_BOTTOM:
                height = 32; # height
                break;
        case WESTON_DESKTOP_SHELL_PANEL_POSITION_LEFT:
        case WESTON_DESKTOP_SHELL_PANEL_POSITION_RIGHT:
                switch (desktop->clock_format) {
                case CLOCK_FORMAT_NONE:
                        width = 32;
                        break;
                case CLOCK_FORMAT_MINUTES:
                        width = 150;
                        break;
                case CLOCK_FORMAT_SECONDS:
                        width = 170;
                        break;
                }
                break;
        }
```

2.2 Background Configuration

Weston supports setting the background pattern and color in the `shell` section of the weston.ini configuration file, such as

```
# /etc/xdg/weston/weston.ini

[shell]
background-image=/usr/share/backgrounds/gnome/Aqua.jpg
# Background pattern (wallpaper) absolute path

background-type=tile
# scale|scale-crop|tile

background-color=0xff002244
# The color format is ARGB8888, effective when no background pattern is set
```

2.3 Idle Time and Lock Screen Configuration

The idle timeout of Weston can be configured in the command options or in the `core` section of weston.ini, such as:

```
# /etc/init.d/S50launcher
  start)
                ...
                weston --tty=2 -B=drm-backend.so --idle-time=0&  # 0 means idle mode is disabled, in seconds
```

Or

```
# /etc/xdg/weston/weston.ini

[core]
idle-time=10
```

Lock screen of Weston can be configured in the `shell` section of weston.ini, such as:

```
# /etc/xdg/weston/weston.ini

[shell]
locking=false
# lock screen is disabled

lockscreen-icon=/usr/share/icons/gnome/256x256/actions/lock.png
# unlock button icon

lockscreen=/usr/share/backgrounds/gnome/Garden.jpg
# background of lock screen
```

2.4 Color Format Configuration

The default display format of Weston in the Buildroot SDK is ARGB8888. For some low-performance platforms, you can configure RGB565 in the `core` section in the weston.ini, such as:

```
    # /etc/xdg/weston/weston.ini

    [core]
    gbm-format=rgb565
    # xrgb8888|rgb565|xrgb2101010
```

You can also configure the display format of each screen individually in the `output` section of weston.ini, such as:

```
    # /etc/xdg/weston/weston.ini

    [output]
    name=LVDS-1
    # output name can be seen in the Weston startup log, such as: Output LVDS-1, (connector 71, crtc 60)

    gbm-format=rgb565
    # xrgb8888|rgb565|xrgb2101010
```

2.5 Display Orientation Configuration

Display orientation of screens can be configured in the `output` section of weston.ini, such as

```
    # /etc/xdg/weston/weston.ini

    [output]
    name=LVDS-1

    transform=90
    # normal|90|180|270|flipped|flipped-90|flipped-180|flipped-270
```

If you want to configure the orientation dynamically, the dynamic configuration file can be used, such as:

```
    echo "output:all:rotate90" > /tmp/.weston_drm.conf # All screens rotate 90 degrees
    echo "output:eDP-1::rotate180" > /tmp/.weston_drm.conf # eDP-1 rotates 180 degrees
```

2.6 Resolution and Scale Configuration

Screen's resolution and scale of Weston can be configured in the `output` section of weston.ini, such as:

```
    # /etc/xdg/weston/weston.ini

    [output]
    name=LVDS-1

    mode=1280x800
    # should be an effective resolution supported by the screen

    scale=2
    # value must be an integer, support application level scaling
```

If you want to scale to a specific resolution(without changing the physical resolution), you can configure it through WESTON_DRM_VIRTUAL_SIZE environment variable, such as:

```
    # /etc/init.d/S50launcher
      start)
                    ...
                    export WESTON_DRM_VIRTUAL_SIZE=1024x768
                    weston --tty=2 -B=drm-backend.so --idle-time=0&
```

If you want to configure resolution and scaling dynamically, the dynamic configuration file can be used, for example:

```
    echo "output:HDMI-A-1:mode=800x600" > /tmp/.weston_drm.conf # change the
resolution of HDMI-A-1 to 800x600
    echo "output:eDP-1:rect=<10,20,410,620>" > /tmp/.weston_drm.conf # eDP-1
display to the position of (10,20), the size is scaled to 400x600
```

When the VOP hardware doesn't support scaling, these kinds of scale requires Rockchip's RGA 2D acceleration.

2.7 Freeze the Screen

When Weston is started, there will be a black screen that switches between boot logo and UI display temporarily. If you want to prevent this black screen, you can freeze the Weston screen content temporarily through the following ways:

Add --warm-up to Weston's command options

```
    # /etc/init.d/S50launcher
      start)
                    ...
                    weston --tty=2 -B=drm-backend.so --idle-time=0 --warm-up&
```

Or

```
    # /etc/init.d/S50launcher
      start)
                    ...
                    export WESTON_FREEZE_DISPLAY=/tmp/.weston_freeze # Set a special configuration file path
                    touch /tmp/.weston_freeze # Freeze the display
                    weston --tty=2 -B=drm-backend.so --idle-time=0&
                    ...
                    sleep 1 && rm /tmp/.weston_freeze& # unfreeze after 1 second
```

Or

```
    # /etc/init.d/S50launcher
      start)
                    ...
                    echo "output:all:freeze" > /tmp/.weston_drm.conf # Freeze the display
                    weston --tty=2 -B=drm-backend.so --idle-time=0&
                    ...
                    sleep 1 && \
                        echo "output:all:unfreeze" > /tmp/.weston_drm.conf& # unfreeze  after 1 second
```

2.8 Screen Status Configuration

The DRM framework supports setting force status for screens:

```
    echo on > /sys/class/drm/card0-HDMI-A-1/status # Force HDMI-A-1 connected
    #on|off|detect, detect means hot-plug
```

For more specific screen status configuration, the dynamic configuration file can be used, for example:

```
    echo "output:DSI-1:off" >> /tmp/.weston_drm.conf # Turn off DSI
    echo "output:eDP-1:on" >> /tmp/.weston_drm.conf # Turn on eDP
    echo "compositor:state:off" >> /tmp/.weston_drm.conf # Turn off display
    echo "compositor:state:sleep" >> /tmp/.weston_drm.conf # Turn off display and touch to wake
    echo "compositor:state:on" >> /tmp/.weston_drm.conf # Turn on display
```

2.9 Multi-screen Configuration

The Buildroot SDK Weston supports multi-screen with the same or different display and hot plug functions. You can distinction different screens based on the name of drm (obtained through Weston startup log or /sys/class/drm/card0-<name>). Some configurations can be set by environment variables, for example:

```
    # /etc/init.d/S50launcher
      start)
                    ...
                    export WESTON_DRM_PRIMARY=HDMI-A-1 # Specify HDMI-A-1 as a main display
                    export WESTON_DRM_MIRROR=1 # In mirror mode (multi-screen with the same display), without setting this environment variable will be with different display
                    export WESTON_DRM_KEEP_RATIO=1 # In mirror mode, scaling maintains the aspect ratio, without setting this variable will be full screen by force
                    export WESTON_DRM_PREFER_EXTERNAL=1 # Turn off the built-in monitor automatically when an external monitor is connected
                    export WESTON_DRM_PREFER_EXTERNAL_DUAL=1 # When an external monitor is connected, keep the first external monitor as the main display by default
                    weston --tty=2 -B=drm-backend.so --idle-time=0&
```

When the VOP hardware doesn't support scaling, it would try to use Rockchip's RGA 2D acceleration.

It also supports disabling the specified screen individually in the `output` section of weston.ini:

```
    # /etc/xdg/weston/weston.ini

    [output]
    name=LVDS-1

    mode=off
    # off|current|preferred|<WIDTHxHEIGHT@RATE>
```

2.10 Configuration of Input Devices

The Weston service requires at least one input device by default. If there is no input device, the special settings in the `core` section of weston.ini is needed:

```
    # /etc/xdg/weston/weston.ini

    [core]
    require-input=false
```

If there are multiple screens in Weston, input devices should be bound to screens, you can configure it through the `output` section of weston.ini, such as:

```
    # /etc/xdg/weston/weston.ini

    [output]
    name=LVDS-1

    seat=default
    # The id for seat of the input device can be found through buildroot/output/*/build/weston-8.0.0/weston-info tool
```

2.11 Calibration of Input Devices

If you need to calibrate the touch screen, you can use WESTON_TOUCH_CALIBRATION environment, such as:

```
# /etc/init.d/S50launcher
  start)
                ...
                export WESTON_TOUCH_CALIBRATION="1.013788 0.0 -0.061495 0.0 1.332709 -0.276154"
                weston --tty=2 -B=drm-backend.so --idle-time=0&
```

The calibration parameters can be obtained by Weston calibration tool: weston-calibrator. After running this tool, a number of random points will be generated, and then click them in sequence to output the calibration parameters, such as: Final calibration values: 1.013788 0.0 -0.061495 0.0 1.332709 -0.276154

Or you can use the new Weston touch calibrator with:

```
# /etc/xdg/weston/weston.ini

            [libinput]
            touchscreen_calibrator=true
            calibration_helper=/bin/weston-calibration-helper.sh
```

Then reboot and run weston-touch-calibrator to calibrate.

2.12 Configuration on the Platform without GPU

The Weston in the SDK uses GPU for render acceleration by default. For platforms without GPUs, Rockchip RGA 2D acceleration can also be used instead.

The detailed configuration requires to enable BR2_PACKAGE_LINUX_RGA and BR2_PACKAGE_PIXMAN in the Buildroot SDK, and add --use-pixman to Weston's command options, such as:

```
# /etc/init.d/S50launcher
  start)
                ...
                weston --tty=2 -B=drm-backend.so --idle-time=0 --use-pixman&
```