Testing Video4Linux Applications and Drivers

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Utilities

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- v4l2-compliance: V4L2 compliance driver testing.

- v4l2-ctl: command line Swiss army knife for v4l2.

- qv4l2: Qt test application.

- v4l2-dbg: allows access to DBG_G_CHIP_INFO, DBG_G/S_REGISTER.

- Core debugging: 'echo 1 >/sys/class/video4linux/video0/debug'.

  - 1: show ioctl name

  - 2: show arguments as well

- Patch adding v4l2 support for valgrind: https://bugs.kde.org/show_bug.cgi?id=338023

Utilities: v4l2-compliance

- Started 6 years ago.

- In February tests for streaming were added.

- New drivers must pass the compliance tests.

- Close to 900 tests are performed.

- Covers all 82 V4L2 ioctls except 9 ioctls: the cropping and selection ioctls, the overlay ioctls and the new VIDIOC_QUERY_EXT_CTRL ioctl.

- It is more strict than the V4L2 specification: it assumes drivers use the correct core frameworks which means that there is no excuse to e.g. support VIDIOC_S_CTRL but not VIDIOC_S_EXT_CTRLS.

- Always compile from the v4l-utils git repository to get the latest tests.

- Demo!

Utilities: v4l2-ctl and qv4l2

- 'Golden Reference' utilities: v4l2-ctl can control V4L2 devices from the command line, qv4l2 is the Qt4 GUI equivalent.

- Kept in sync with the kernel and support for new V4L2 kernel APIs is always added to these utilities.

- v4l2-ctl is ideal for embedded systems.

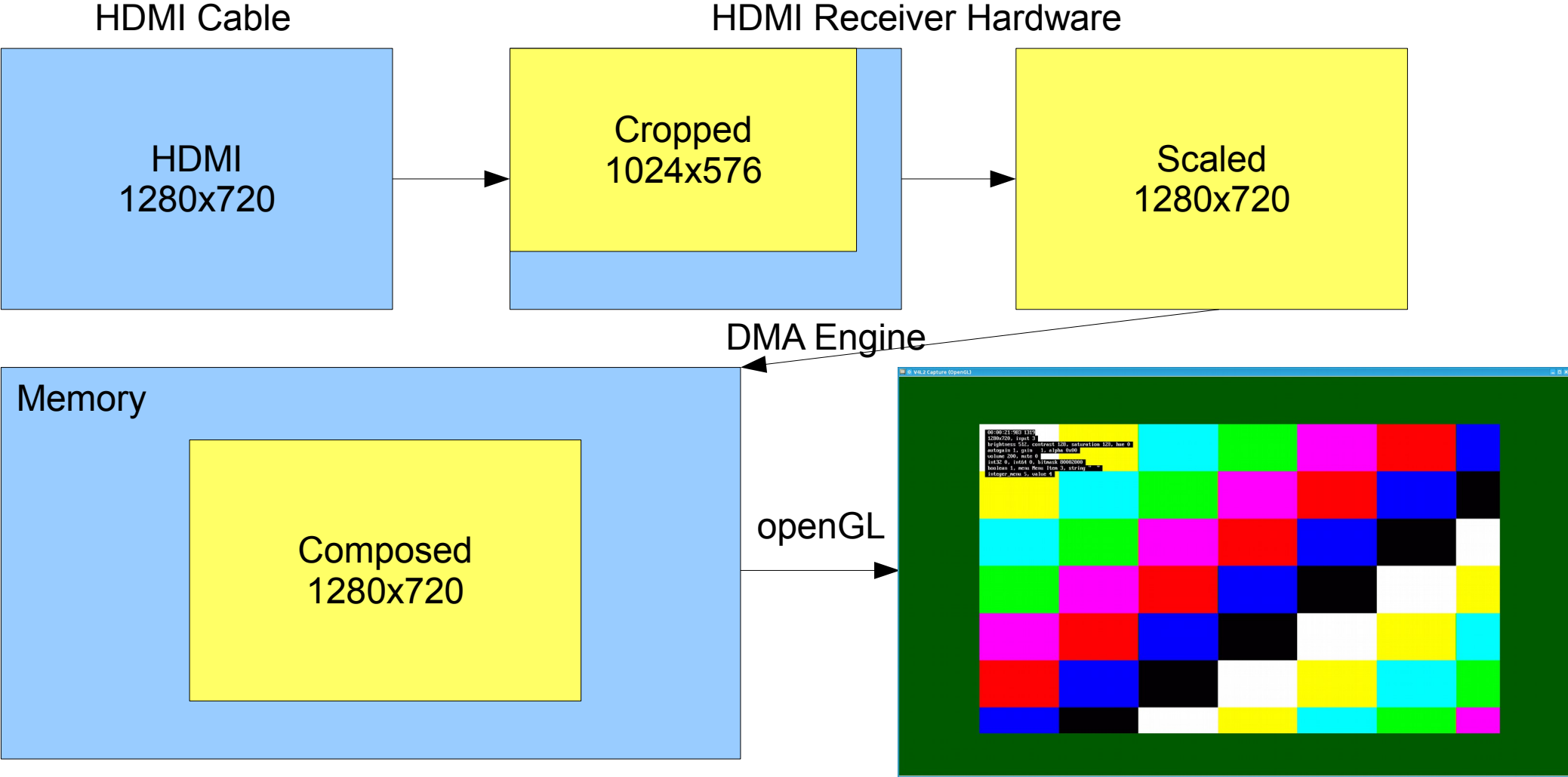- qv4l2 is ideal for interactive testing.

- Demo!

Test Drivers

Test Drivers

- vivi: simple but non-standard video capture

- mem2mem_testdev: memory-to-memory test driver

- vivid: video capture & output, vbi capture & output, radio receiver & transmitter, software defined radio capture. Closely emulates what 'real' hardware will do.

- Most V4L2 devices only support a (very) limited subset of the V4L2 API. Without test drivers (or a huge collection of hardware) it is impossible to test your application, but with the vivid driver you can.

- Demo!

Cropping, Scaling and Composing

HDMI Cable

HDMI Receiver Hardware

HDMI
1280x720

Cropped
1024x576

Scaled
1280x720

DMA Engine

Memory

Composed
1280x720

openGL

Resources

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- Linux Media Infrastructure API: http://linuxtv.org/downloads/v4l-dvb-apis. Latest version: http://hverkuil.home.xs4all.nl/spec/media.html

- Documentation/video4linux/v4l2-framework.txt and v4l2-controls.txt

- include/media/videobuf2-core.h

- Upstream media git repository: http://git.linuxtv.org/media_tree.git

- Skeleton driver: Documentation/video4linux/v4l2-pci-skeleton.c

- v4l-utils git repository: http://git.linuxtv.org/v4l-utils.git

- linux-media mailinglist & irc channel: http://linuxtv.org/lists.php

- vivid driver: http://git.linuxtv.org/cgit.cgi/hverkuil/media_tree.git/log/?h=vivid Detailed description in Documentation/video4linux/vivid.txt.

Thank You!