Linux display and video: one problem, three solutions, many puzzled developers

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Problem Definition
graphics / video
format
memory/deep pipeline
device/CPU
rotation
scaling
composing
Problem - Stack

X11
Wayland
DirectFB
Raw API
DRM
FBDEV
V4L2
DRM == PC

(mis)conceptions
FBDEV is the only practical solution for embedded platforms?
DRM requires a complex userspace stack

(mis)conceptions
Drivers should implement multiple interfaces

(mis)conceptions
Frame Buffer Device
Video 4 Linux 2
Direct Rendering Manager
Present
<table>
<thead>
<tr>
<th></th>
<th>DRM</th>
<th>FB</th>
<th>V4L2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Dynamic Allocation</strong></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Multiple Buffers</strong></td>
<td>Yes</td>
<td>panning</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Import</strong></td>
<td>dmabuf</td>
<td>No</td>
<td>userptr</td>
</tr>
<tr>
<td><strong>Export</strong></td>
<td>dmabuf, mmap</td>
<td>mmap</td>
<td>mmap</td>
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</table>

**Memory Management**
<table>
<thead>
<tr>
<th></th>
<th>DRM</th>
<th>FB</th>
<th>V4L2</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>KMS</strong></td>
<td>Yes</td>
<td>Yes</td>
<td>Yes</td>
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<tr>
<td><strong>Formats</strong></td>
<td>4CC</td>
<td>RGB 4CC</td>
<td>4CC</td>
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<tr>
<td><strong>Enumeration</strong></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td><strong>Negotiation</strong></td>
<td>No</td>
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### Transformations

<table>
<thead>
<tr>
<th>Feature</th>
<th>DRM</th>
<th>FB</th>
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<tbody>
<tr>
<td>Overlays</td>
<td>Yes</td>
<td>No</td>
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</tr>
<tr>
<td>Rotation</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Scaling</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
</tr>
<tr>
<td>Cropping/Panning</td>
<td>Yes</td>
<td>Yes</td>
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## Acceleration

<table>
<thead>
<tr>
<th></th>
<th>DRM</th>
<th>FB</th>
<th>V4L2</th>
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</thead>
<tbody>
<tr>
<td>2D</td>
<td>No</td>
<td>Console</td>
<td>No</td>
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<tr>
<td>3D</td>
<td>Yes</td>
<td>No</td>
<td>No</td>
</tr>
<tr>
<td>Cursor</td>
<td>Yes</td>
<td>Yes</td>
<td>No</td>
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<tr>
<td>Composing</td>
<td>No</td>
<td>No</td>
<td>No</td>
</tr>
</tbody>
</table>
The DRM core exports several interfaces to applications, generally intended to be used through corresponding libdrm wrapper functions. In addition, drivers export device-specific interfaces for use by userspace drivers & device-aware applications through ioctlls and sysfs files.

External interfaces include: memory mapping, context management, DMA operations, AGP management, vblank control, fence management, memory management, and output management.

Cover generic ioctlls and sysfs layout here. We only need high-level info, since man pages should cover the rest.
Documentation
Code Size
Cumulative Changes - API
Cumulative Changes - Drivers
Mailing List Traffic
The Future
NEXT EXIT
Source: http://www.flickr.com/photos/buckaroobay/3721809183/
dmabuf
dri2video


Targets: DRM
panel & backlight

http://lwn.net/Articles/512363/
Personal opinion

Flame war possible
Handle with care
DRM needs to support dumb devices better!
V4L2 still has use cases!
FBDEV should be deprecated!
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