Status of the Graphics Stack on FreeBSD

Jean-Sébastien Pédrón

The FreeBSD Project

The X.Org Developer’s Conference, 2014
Introduction

Structure of this presentation

- Our major problems
- For each problem, planned solutions

For the 2 or 3 people in the room not using FreeBSD

- Description of FreeBSD-specific concepts
- Stop me if something is unclear!
Outline

In the kernel
   A bit of history
   Drivers maintenance

In the Ports tree
   What is the Ports tree?
   Video drivers in FreeBSD releases
   The WITH_NEW_XORG mess

With the community

Future challenges
A bit of history

The era before KMS

- Originally: DRM shared with Linux and others
- Maintained by Eric Anholt

Then, KMS became mandatory

- Newer Intel GPUs only supported by the kernel driver
- Radeon GPUs to follow
- FreeBSD didn’t participate in the development
A bit of history

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A bit of history

2012: import of i915 KMS driver

- Copy of the old DRM code
  
  `sys/dev/drm → sys/dev/drm2`

- Import of i915 from Linux 3.2 (?)

- Only features required by i915 added to DRM device-independent code

- Linux APIs and data structures replaced by FreeBSD’s ones

- Available in FreeBSD 9.1
A bit of history

2013: import of Radeon KMS driver

- Import of TTM and Radeon from Linux 3.8
- Some additions to DRM device-independent code
- Linux APIs and data structures replaced by FreeBSD’s ones
- Available in FreeBSD 9.3
Drivers maintenance

 Gratuitous changes all over the place

- Usage of FreeBSD APIs and data structures
- Incomplete implementation of DRM
- Some variables renamed

⇒ Very hard to import new code from Linux
Drivers maintenance

Resuming work

What’s ready

- Update to i915 close to completion
- Sync DRM device-independent code with Linux 3.8 ready

In the longer term

- Plan to use a Linux API wrapper to ease the work
  Caveat: need to convince people
- Get rid of the code duplication (drm vs. drm2 directories)
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What is the Ports tree?

The Ports tree

What is the Ports tree?

- Packaging of 3rd-party applications
- Repository of Makefiles and patches
- Equivalent of debian directories or .spec files

How to install a port

```bash
cd /usr/ports/x11-servers/xorg-server
make all install clean
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(higher-level tools are available)
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What is the Ports tree?

The Ports tree

- Unique tree for all supported releases of FreeBSD
- Pro: All releases have access to recent applications
- Con: A package needs to handle missing features in older releases

J.S. Pédron

Graphics Stack on FreeBSD
What is the Ports tree?

**The Ports tree**

- Historically: distribution of the Ports tree
- For a year: transition to binary packages as 1st class citizen
- Require many changes in the Ports tree and in habits
- Missing features
  - For us, a `Provides`-like mechanism
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Remember

- One tree to support all releases
- No Provides-like feature

⇒ "Solution" (as in ugly workaround): WITH_NEW_XORG
WITH_NEW_XORG: how it works

- Build-time flag in the Ports tree
- Select between two sets:

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WITH_NEW_XORG: how it works doesn’t work

- Build-time: unsuitable for a binary packages repository
- Bind two unrelated applications: xserver and Mesa
- Nightmare to maintain
- Very confusing for end users
- Only solution until Provides feature is implemented

⇒ A fiasco for both developers and end users
### The WITH_NEW_XORG mess

**WITH_NEW_XORG: how it works doesn’t work**

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The WITH_NEW_XORG mess

WITH_NEW_XORG: about to be removed!

- Way too expensive to maintain
- Cripple progress on today’s software/hardware
- Cairo 1.12 + xf86-video-intel 2.7 already crash X
- Took a long time to convince people...
Outline

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With the community

Future challenges
Our team

Small

- Two developers in the kernel
- Two developers in the ports
- Not all fully dedicated to the graphics stack

Still learning

- Lack of X11 expertise and understanding of hardware
- Low confidence in what we do sometimes
Users are afraid of changes

- Big rocky jumps instead of small incremental changes
  Example: xserver 1.7/Mesa 7.6 → xserver 1.12/Mesa 9.1
- We don’t teach our users
  Example: Why are video drivers moved to the kernel?
- Many FreeBSD developers use Mac OS X
  ⇒ Gives a bad impression
No relation with upstream

- Little effort to talk and work with you
- Only consuming, almost no contribution
Talking about what we do

Existing tools

- A wiki section dedicated to the graphics stack
- Quarterly status reports
- Increased presence on mailing-lists and IRC

Explore more methods

- Improve bug reports handling
- Increase publications, maybe on a blog?
- Teach users
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Future challenges
The KMS drivers

- Finish to sync DRM and drivers with Linux 3.8
- Sync with later Linux release (3.10?)
- Implement dmabuf/PRIME
- Import Nouveau as time permits
GPGPU and OpenCL

- Continue the work on an alternative to udev
- Finish packaging of libgbm and Clover
Root-less X server

- Work on an alternative to systemd-logind?
Wayland and Weston

- Help with the evdev GSoC
- Finish packaging of Wayland
- Port libinput
- Port Weston
Working again with you all!

- Contribute code
- Talk with you
- Come back to XDC
For further reading

Our wiki section.
Roadmap, projects’ status and contact information.
https://wiki.freebsd.org/Graphics
Summary

- Get rid of the legacy graphics stack in the Ports tree
- Ease the work in the kernel
- Improve our communication skills
- Work with you