

X.Org & BSD - Changes ahead

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OpenBSD/X.Org



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Agenda

- 1 Introduction
- 2 Some history...
- 3 The present
- 4 The future
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Introduction

- X is the underlying technology for all the ~~Linux~~ BSD on the desktop stuff.
- Often mis-understood by users (normal) and developers (less normal).

Goals of this talk:

- provide some information to *BSD developers on directions of the X window system
- attract some developers to X

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late 80's - X11R5

- Mostly monochrome or 8 bit colour (indexed) frame-buffers
- Simple non-anti-aliased drawings
- Server side non-anti-aliased text rendering
- Athena widgets and Motif toolkits
- First steps at porting to the i386/PC architecture (X386, XFree86 2.1)

But relatively small and efficient for the epoch

90's - X11R6

- Initial X11R6 release done by the X Consortium.
- No radical change in hw or core rendering model
- Lots of extensions and peripheral functionalities (Xprint, LBX, PEX, XIE, XKB, Xinput,..)

XFree86 contributions :

- Modular X server architecture
- XAA: 2D hw acceleration
- DRI: 3D hw acceleration based on Mesa3D (OpenGL)

During this period, lots of code growth (and bloat) but few benefits for the end-users (focus on new hardware support).

Early 2000 - Xrender

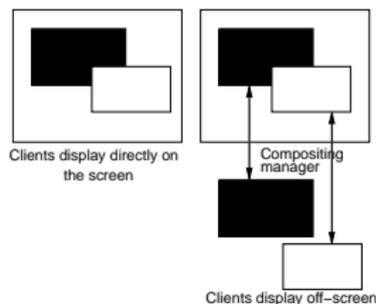
- Porter & Duff compositing inside a window
- fb + render code
- Font rendering in the client, with anti-aliasing
- KAA (EXA) new 2D hw acceleration framework
- Cairo new 2D drawing library

A political interlude

- Some developers unhappy with the XFree86 development model
- Put together the new X.Org foundation to resume X development
- XFree86 decides to change its license in a way that made it irrelevant in a couple of weeks...
- 1st visible change of the new X.Org foundation: change the build system to modular (autotools based).

Mid 2000's - Compositing desktop: Xgl & Compiz

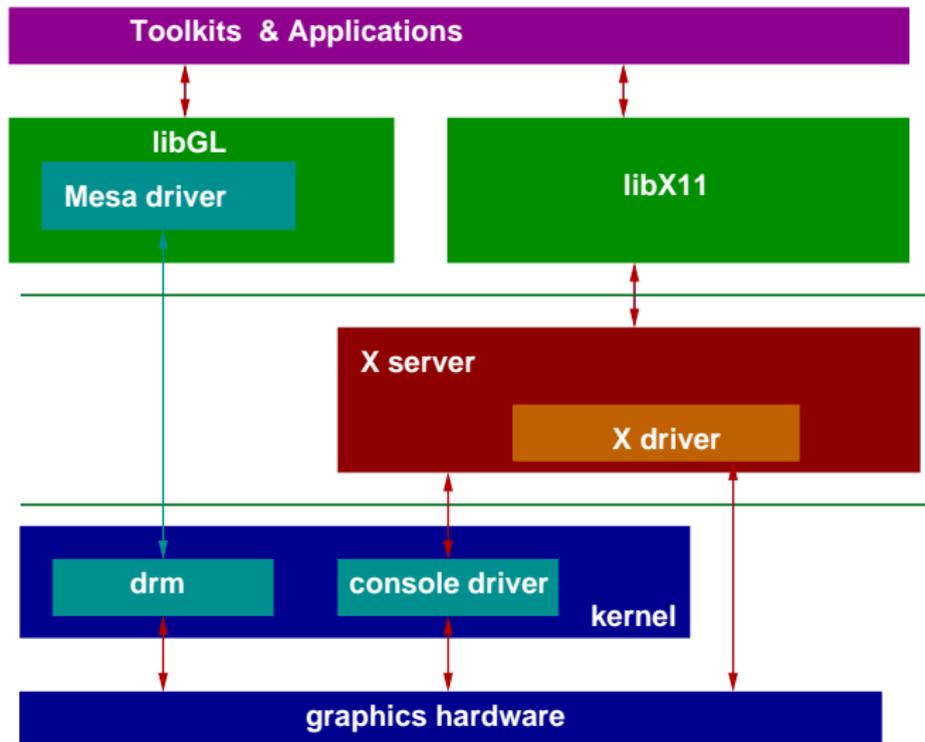
- New desktop model: windows are rendered off-screen first and then "composited" together on the desktop.
- Using 3D transforms between off-screen and the desktop, and hw-accelerated compositing based on OpenGL
- Evolutions : AIGLX, removing the need for Xgl, better Xvideo support,...
- XCB: new C bindings for the X11 protocol, based on an XML specification.



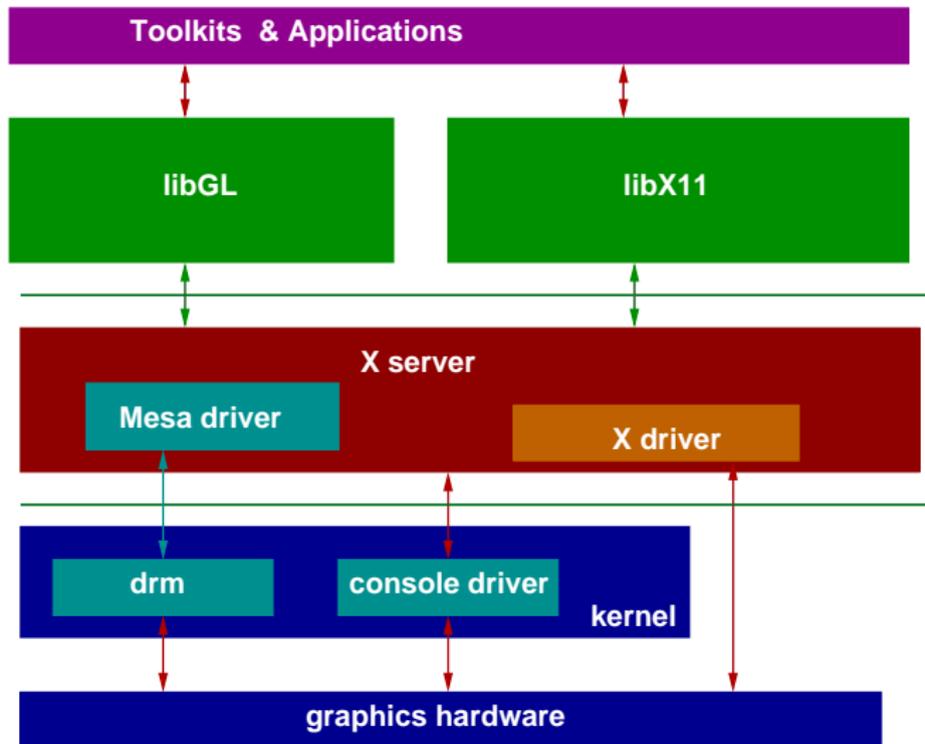
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X architecture - direct rendering



X architecture - indirect rendering



Last year: X.Org 7.3

New features in X.Org 7.3

- **XRandr 1.2**: dynamic management of screens
- new **pixman** library, to share many of the pixel-level compositing code between X server and other libs (Cairo) that need them.
- New intel driver, independent of the BIOS for mode-setting. Implements XRandr 1.2.
- Input hot-plug support and code clean-ups (breaks some existing drivers)
- Composite enabled by default
- XKB code cleanups
- Support for DTrace on Solaris
- Improvements in drivers and EXA code
- More auto-configuration capabilities

Coming next: X.Org 7.4

- New pciaccess library for PCI bus access
- XACE replaces X Security extension
- Generalisation of XRandr 1.2 in drivers
- Radeonhd driver (based on newly available docs from AMD/ATI)

OpenBSD Status

- OpenBSD 4.2 (released Nov. 1) includes X.Org 7.2
- OpenBSD 4.3 (to be released on May 1) will include X.Org 7.3.
- Work has started on porting DRI, based on NetBSD's port.
 - still very alpha, not enabled by default
 - will crash your machine !
- libpciaccess is being ported,
- We should be able to include X.Org 7.5 in OpenBSD 4.4.

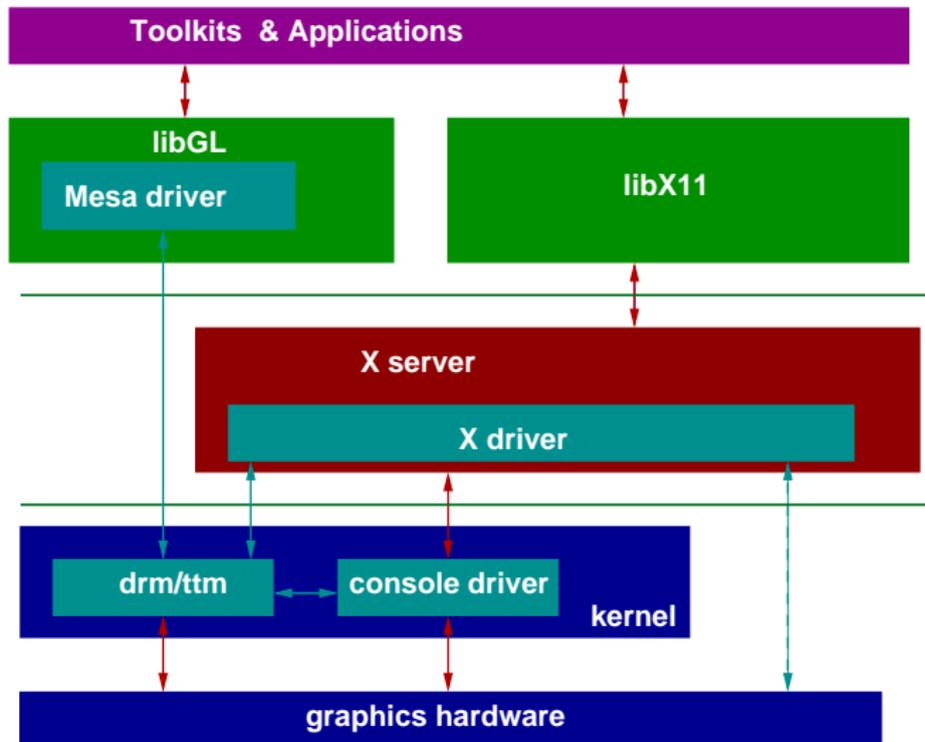
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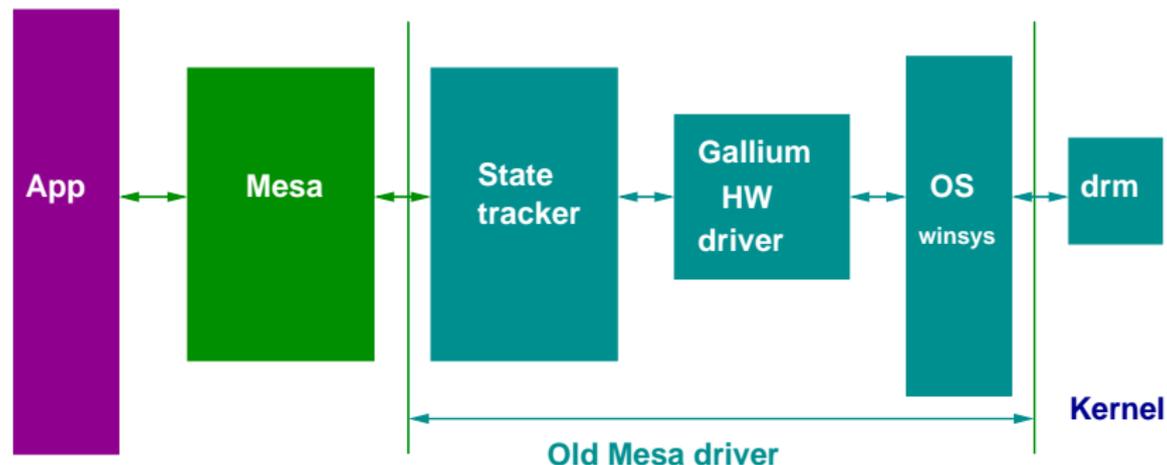
Work in progress

- X server internal API cleanups
- XRandR 1.3: support for several separate cards
- TTM - new memory management code in DRM, uses more Gart features, enables the kernel instead of the userland X server to manage video memory.
- DRI 2 + Gallium: new architecture for Mesa3D drivers. Closer to the hardware.
- MPX - multi-pointer X
- Input transforms for composite
- In-kernel mode-settings

X architecture - DRI2



Gallium



- make drm simpler / closer to modern 3D HW
- hw independant state trackers takes care of OpenGL

Multi Pointer X

- Virtual pointers - cursors
 - attached to zero or more physical devices
 - provide the events to the applications
- Virtual keyboards - focus
 - attached to zero or more physical devices
 - provides the events to the applications

*BSD TODO

- Input hot-plug HAL/DBus ?
- Porting more DRM's (nouveau, ...)
- TTM
- Framework for in-kernel mode settings
- Promote the MIT/BSD license

NetBSD/OpenBSD Legacy architectures

Problems:

- 8 bits or less displays
- slow CPUs and limited RAM
- gcc 2.95/a.out/no shared libs (OpenBSD)

X.Org evolution is slowly but firmly stopping to support those arches. (Modern embedded systems have 16bit or better)

Solutions:

- port kdrive to the BSD console drivers (partly done - to be debugged)
 - but kdrive needs gcc3 or better
- a new simple X server with only semi-legacy technologies (no Composite, no OpenGL, no fancy Xinput)?

Some news from X.Org foundation

Current Board of Directors:

Eric Anholt	Egbert Eich	Matthieu Herrb	Adam Jackson
Bart Massey	Keith Packard	Daniel Stone	Carl Worth

On going work:

- XDC - Google campus, Mountain View Ca, april 2008
- XDS - UK or Ireland september 2008
- New foundation membership agreement - boost membership
- New PR committee - better communication

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Conclusion

- X development is going well
- Again exploring the leading edges of user interfaces
- Challenge for *BSD to participate and not only follow

Some open issues:

- Colour management
- Hardware documentation for Open-Source drivers (nVidia,...)

Questions ?