Project Summary

The amdgpu project will unify AMD’s Linux® driver offerings

A key component is the new open source Base Graphics Driver\(^1\) which will:
- be upstreamed as much as possible
- be unified to support both closed and open source user mode driver stacks to fit multiple use cases
- consolidate advantages and features of current AMD Radeon™ and AMD Catalyst™ graphics drivers

Requires changes in both closed source and open source user mode drivers to work with this new open source Base Graphics Driver.

1. Base Graphics Driver includes kernel graphics driver, user/kernel interface libraries and DDX driver
The existing open source AMD Radeon driver and new amdgpu driver leverage upstream components

- TTM – Open source graphics memory manager
- DRM – Open source graphics modesetting and GPU infrastructure
- GBM – Generic Buffer Manager for EGL
- DRI – Protocol for sharing buffers between X and other UMDs
- Glamor – X acceleration layer

We are not open sourcing the existing AMD Catalyst code base

- amdgpu is based on current upstream open source AMD Radeon kernel driver
- Component expertise (display, power management, etc.) will be leveraged in new form
AMD Linux Stacks

**All Open**
- Open source Base Graphics
- KFD and HSA runtime
- Open source UMDs
  - OpenGL
  - Multimedia
  - OpenCL™

**Non-Pro**
- Open source Base Graphics
- KFD and HSA runtime
- Closed source UMDs
  - OpenGL
  - Multimedia
  - OpenCL

**Pro**
- Open source Base Graphics
- KFD and HSA runtime
- Closed source UMDs
  - OpenGL
  - Multimedia
  - OpenCL
- FirePro add-ons

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1. Base Graphics includes kernel graphics driver, user/kernel interface libraries and DDX driver
Stack Diagram: All Open

User Space

Kernel Space

Mesa Open Source UMDs

- DDX Driver
- VAAPI Gallium
- OpenGL Gallium
- OpenMAX Gallium
- VDPAU Gallium
- OpenCL™ Gallium

User Kernel Interface Libraries (libdrm_amdgpu)

KFD

Kernel Graphics Driver (amdgpu)

HSA Thunk

HSA Runtime

Open Source (upstream)

Closed Source

Open Source (May not upstream)
Stack Diagram: Non-Pro

- HSA Runtime
  - HSA Thunk
  - User Kernel Interface Libraries (libdrm_amdgpu)
    - OpenGL
    - OpenCL™
    - MMD

Kernel Graphics Driver (amdgpu)

- User Space
- Kernel Space

Closed Source UMDs/Apps

Open Source (upstream)

Closed Source

Open Source (May not upstream)

DDX Driver
Stack Diagram: Pro

- **User Space**
  - HSA Runtime
  - HSA Thunk
- **Kernel Space**
  - KFD
  - Kernel Graphics Driver (amdgpu)
  - AMD FirePro Interfaces
    - User Kernel Interface Libraries (libdrm_amdgpu)
  - AMD FirePro Interfaces
    - OpenCL™
    - OpenGL
    - MMD
    - FirePro Service
  - DDX Driver
    - AMD FirePro™ Add-on
  - AMD FirePro™ Add-on

- **Source Labels**
  - Open Source (upstream)
  - Closed Source
  - Open Source (May not upstream)
What does it look like?

Kernel driver (amdgpu)
- Command submission and memory management IOCTL interfaces based on open source AMD Radeon™
- Uses common KMS modesetting IOCTL interface

User/kernel interface lib (libdrm_amdgpu)
- Common interface for command submission, memory management, buffer sharing, etc.
- Supports both open and closed UMDs

AMD FirePro™ add-on
- Only if absolutely necessary
- Will be open source

Xorg ddx (xf86-video-amdgpu)
- Uses glamor for 2D/Xv acceleration

UMDs
- Mesa UMDs for open source
- AMD Catalyst™ UMDs for closed source
Challenges

- Lots of areas
  - HW IP (registers, packets, etc.)
  - Code
  - Documentation

- We are not open sourcing existing AMD Catalyst™ code base
Challenges - IP Review

⚠ Current model
  - Review IP for open source release as needed

⚠ New model
  - Readiness for open source happens at HW design time
Challenges - Code

▲ Developer ramp up

- Internal developers need to gain experience working in public
- What’s safe and what’s not safe to code and discuss
- Ramp up period before interacting with the public repos directly
- Guidance from established open source developers
Challenges - Documentation

What is there?
- 3D register reference guides
- 3D programming guides
- Shader ISA reference guides

What about the future?
- Documentation that can be released publically progressively integrated into the hw design cycles
Why are there still closed source components?

Certain customers need certain key features today
- Workstation features
- OpenGL 4.x
- OpenCL™

Future
- More focus on open source
Where we are now / Future

Where we are
- Prototype support for Sea Islands
- Newasic support underway

Future
- Open source support for all new asics currently planned to be on amdgpu
Community Feedback

We look forward to community feedback

- Features to support
- Improvements to focus on
- Testing
- Better integration with upstream projects
Questions

Questions?
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