ATI Radeon Driver for Plan 9

Implementing R600 Support

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Radeon Numbering System

- ATI has released many cards under the Radeon label.
- Modern cards are prefixed with "HD".

Rough Mapping from Chipset to Marketing Name

R200 : Radeon {8500, 9000, 9200, 9250}

R300 : Radeon {9500, 9600, 9700, 9800}

R420 : Radeon {X700, X740, X800, X850}

R520 : Radeon {X1300, X1600, X1800, X1900}

R600 : Radeon HD {2400, 3600, 3800, 3870 X2}

R700 : Radeon HD {4300, 4600, 4800, 4800 X2}

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- R700 is an optimized R600.

Current Driver Status / Goals

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- Support multiple chipsets in a clean manner in one driver.
- Include an ATOMBIOS parser.
- Drive the R600 family ($\approx$ Radeon HD 3850).
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The rest of this talk expands on these ideas in greater detail.

Available Documentation

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In order to facilitate supporting new cards, the Plan 9 driver must be updated to make use of two features present since R520.

- ATOMBIOS (discovered from RadeonHD)
- Command Processor (discovered from ATI documentation)

What is ATOMBIOS?

ATOMBIOS is:

- A collection of card-specific data tables and scripts stored in ROM on Radeon cards since R520.
- Accessible via a common interface regardless of card family or model.
- A $\approx 10,000$ line parser provided in part by ATI, in part by reverse-engineering from the RadeonHD team.

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This is a very nice substitute for register twiddling, at the price of dragging along (and porting) an enormous codebase.

- Also, Plan 9 can't use most of the provided features.
- But without ATOMBIOS, we have to discover and hardcode undocumented defines for BIOS data, for each card.

Sample ATOMBIOS Commands

Example ATOMBIOS Exercising Code from Radeon

RHDAtomBiosFunc(pScrn->scrnIndex, NULL, ATOMBIOS_INIT, &atomBiosArg)

A sampling of available commands:

- ATOMBIOS_ALLOCATE_FB_SCRATCH
- GET_DEFAULT_ENGINE_CLOCK
- ATOM_SET_VOLTAGE
- ..hundreds more. (Radeon has a smaller list than RadeonHD.)

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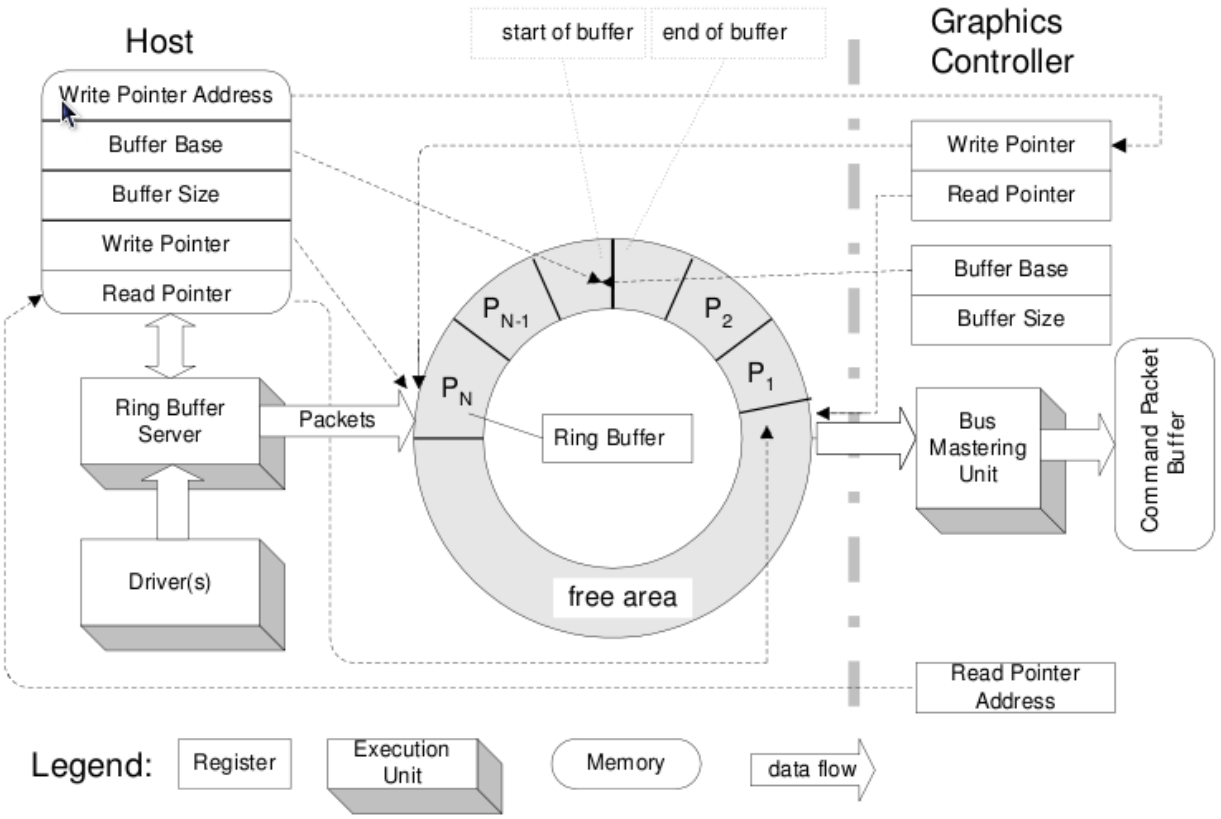
The R6xx documentation only mentions the ring buffer method. The current driver uses the push method in a FIFO.

Ring Buffer Implementation



http://developer.amd.com/gpu_assets/RRG-216M56-03oOEM.pdf

What about the rest of needed functionality?

Well, there's no documentation on that.

- A great component of this project is copying logic from the Radeon driver.
- Another great component of this project is hope.

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Logically, aux/vga executes first.

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3. snarf()
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4. load()
   - Write the Ctrl's modified registers out to the card.

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The kernel driver for the Radeon is responsible for:

- Setting the dedicated mmio regions.
- Calling the appropriate functions to drop the card and vga driver into linear mode (unless you want segmented mode).
- Providing hardware acceleration functions.
  - In our case, that means using the 3D engine.

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Only about $1,500$ lines of actual logic, hopefully.

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4. Work on enabling the 3D Engine.

questions?