
# ATI Radeon™ 4800 series Graphics

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# Graphics Processing Units

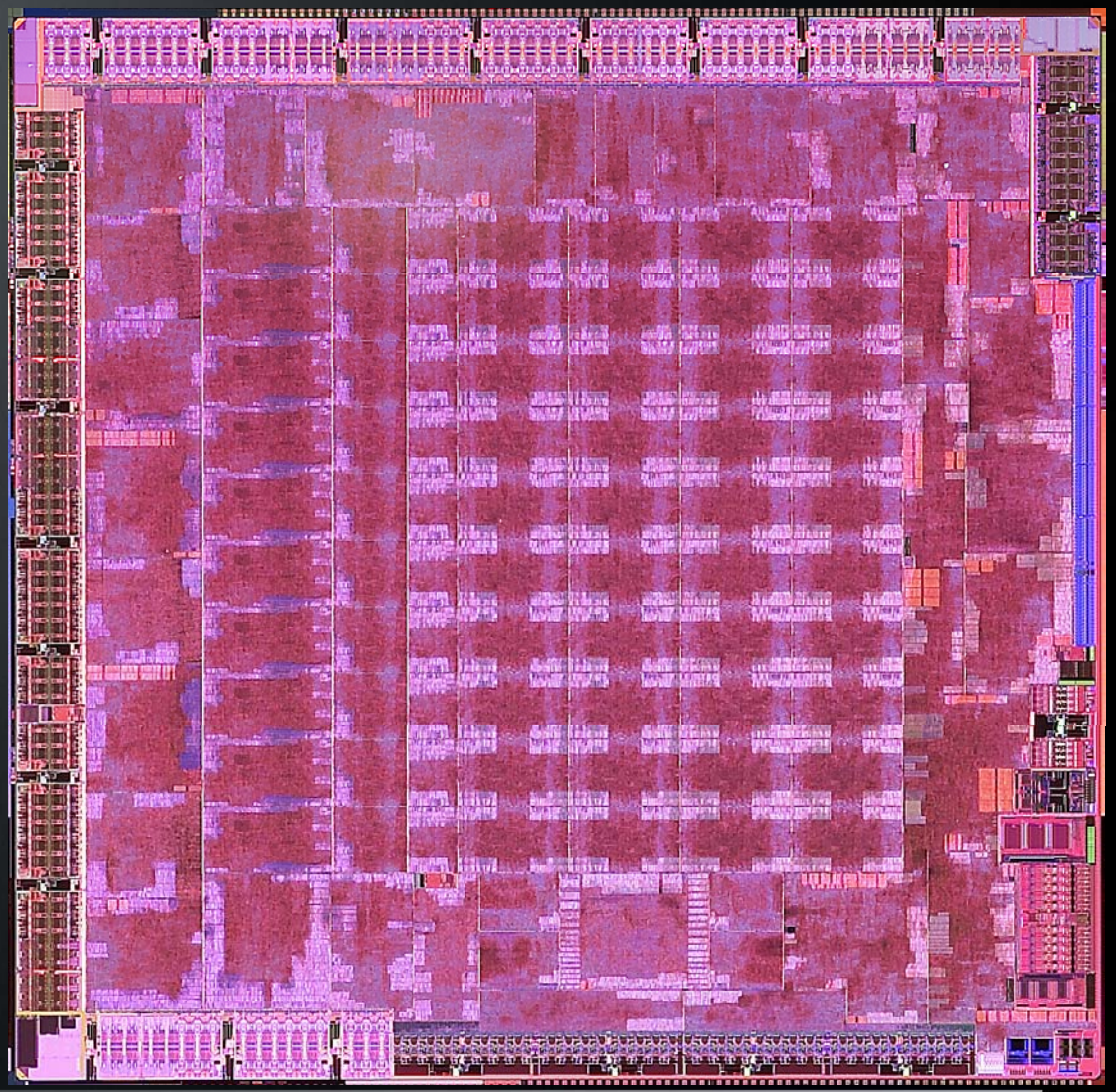
- ATI Radeon™ HD 4870
- AMD Stream Computing
- Next Generation GPUs

# ATI Radeon™ HD 4800 Series

- Performance per watt/mm²/dollar
- ATI Radeon™ HD 4870
  - USD$299 (MSRP)
  - 1.2 teraFLOPS
  - Core clock 750 MHz
  - 512 MB of GDDR5 - 3.6 gigabits/s
  - dual-slot PCI Express 2.0
  - 160 watts (TDP)
- ATI Radeon™ HD 4850
  - USD$199 (MSRP)
  - 1 teraFLOP
  - Core clock 625 MHz
  - 512 MB of GDDR3 - 2 gigabits/s
  - single-slot PCI Express 2.0
  - 110 watts (TDP)

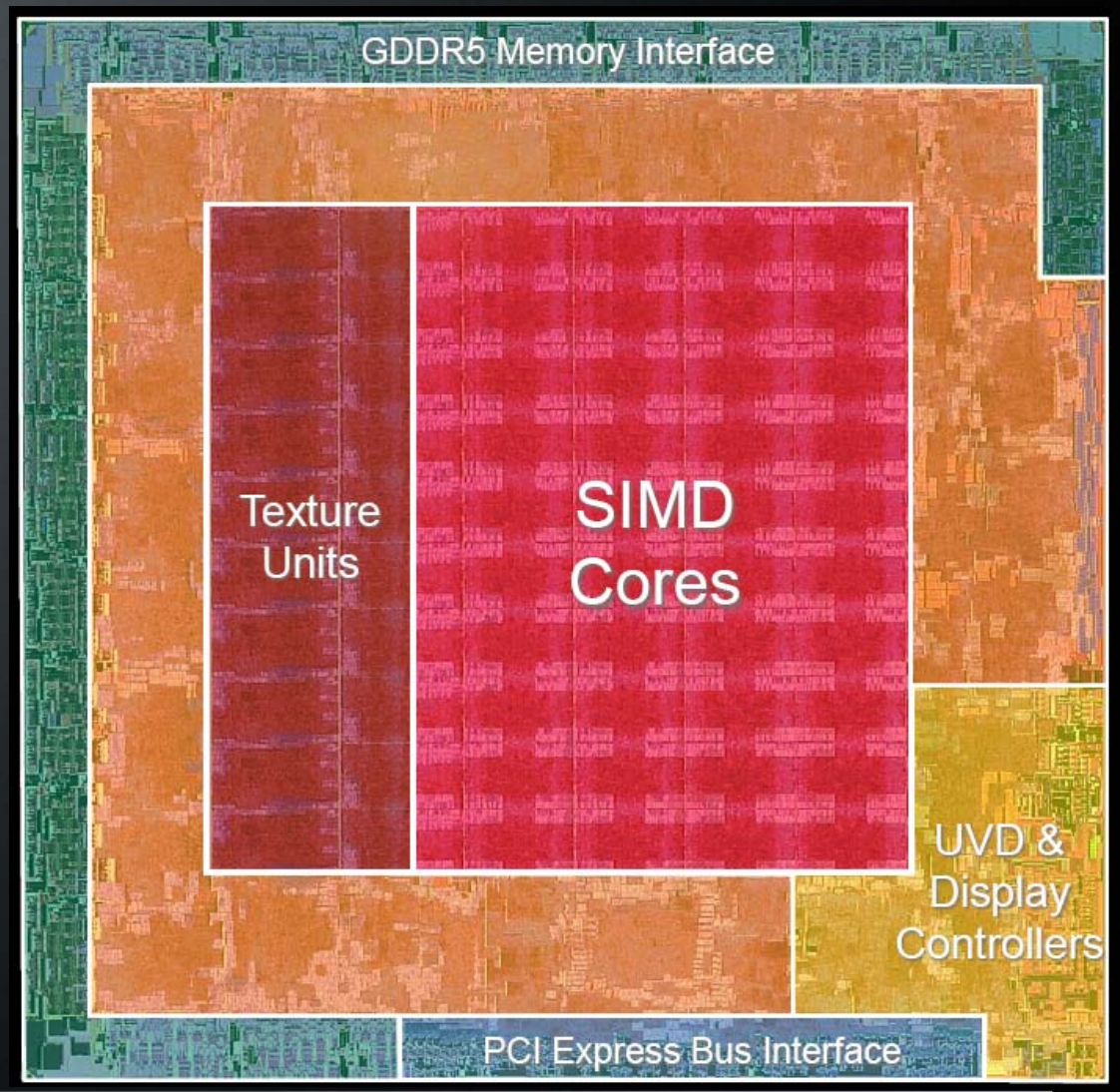

# ATI Radeon™ HD 4800 Series

- 260mm$^2$
- 956 MTransistors
- 64 z/stencil
- 40 texture
- 10 SIMDs
  - 800 shaders



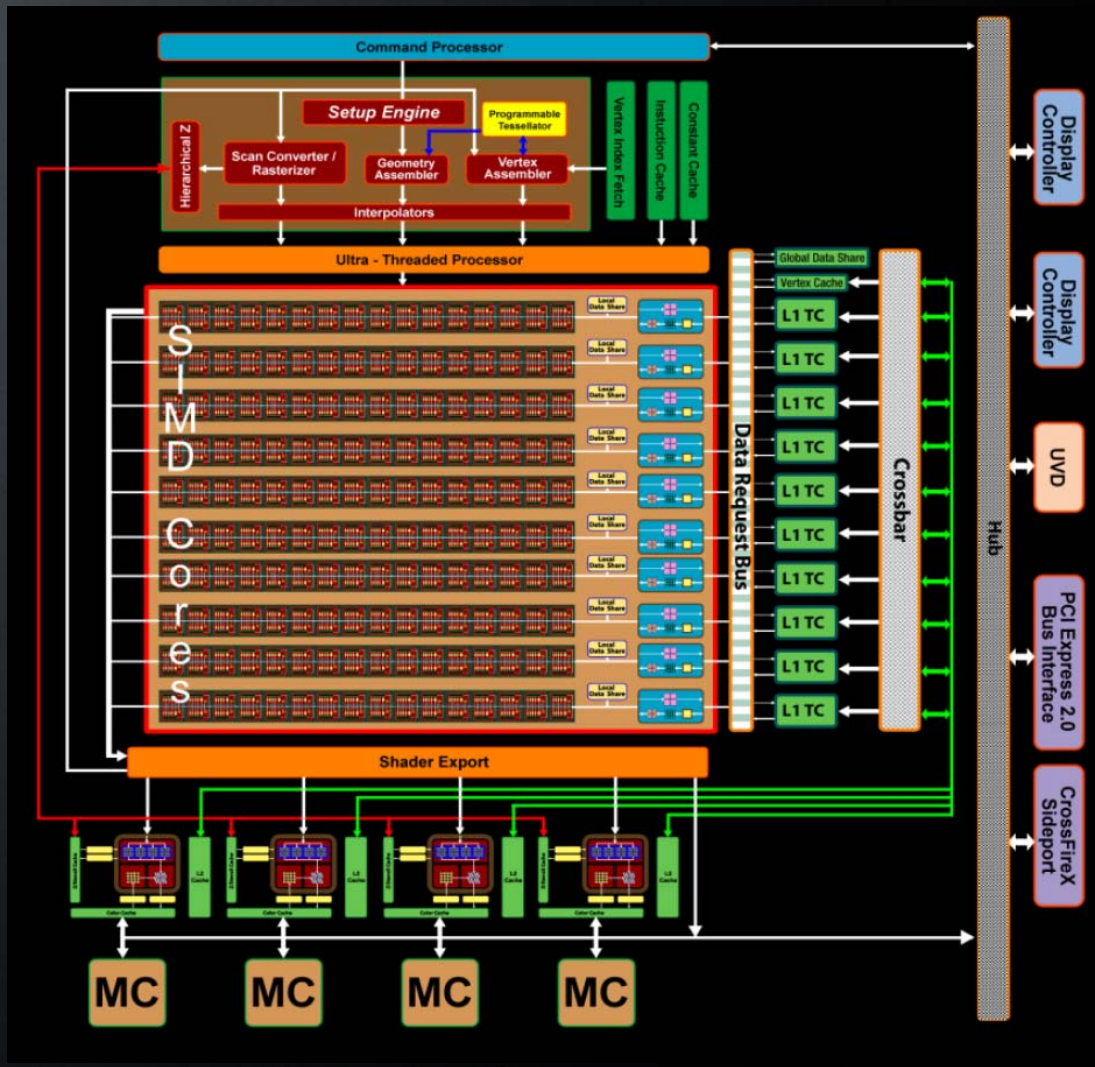
# ATI Radeon™ HD 4800 Series

- 260mm$^2$
- 956 MTransistors
- 64 z/stencil
- 40 texture
- 10 SIMDs
  - 80 32bit FP Stream Processing Units (SPUs)



# ATI Radeon™ 4800 Series Architecture

- 800 stream processing units
- New SIMD core layout
- New texture cache design
- New memory architecture
- Optimized texture and render back-ends
- Enhanced geometry shader






AMD
The future is fusion

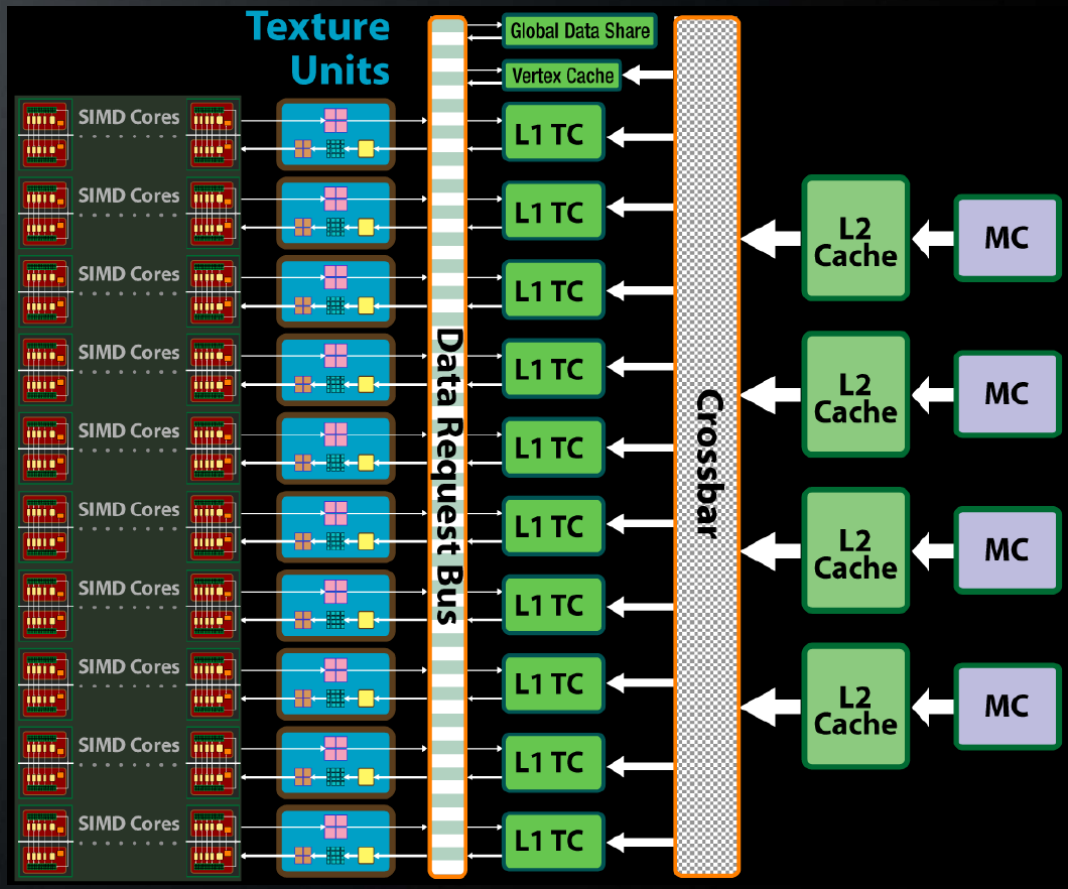
# SIMD Cores

- Each core:
  - Includes 80 scalar stream processing units in total
  - 16KB Local Data Share
    - Persistent allocation of data between wavefronts
  - Has its own control logic and runs from a shared set of threads
  - Has 4 dedicated texture units + L1 cache
  - Communicates with other SIMD cores via 16KB Global Data Share
    - Data sharing between threads running on different SIMDs
- New design allows texture fetch capability to scale with shader power, maintaining 4:1 ALU:TEX ratio

# Texture Units

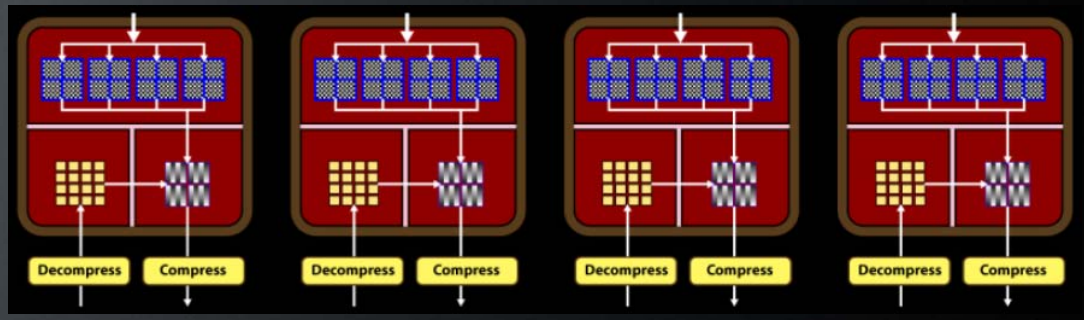
New cache design

- L2s aligned with memory channels
- L1s store unique data per SIMD
  - 2x increase in effective storage per L1*
  - 5x increase overall*
- Separate vertex cache
- Increased bandwidth
  - Up to 480 GB/sec of L1 texture fetch bandwidth
  - Up to 384 GB/sec between L1 & L2




*compared to ATI Radeon™ 3870

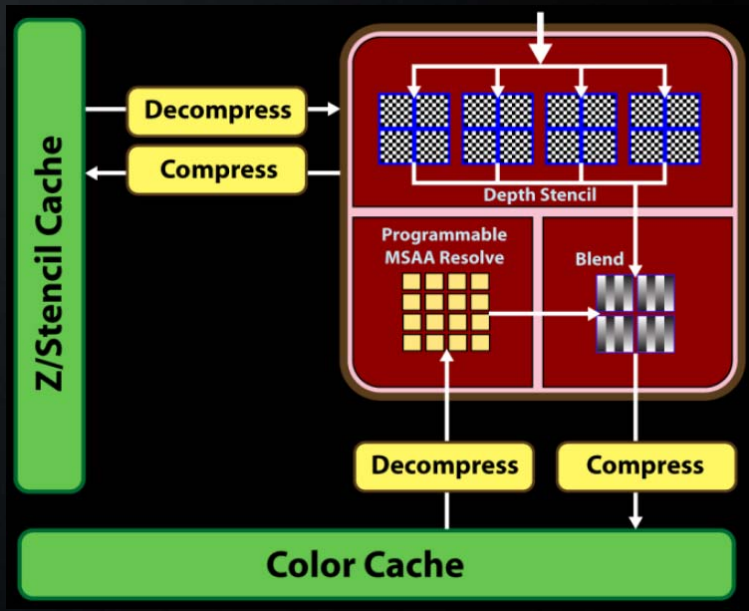
# Render Back-Ends




- Focus on improving

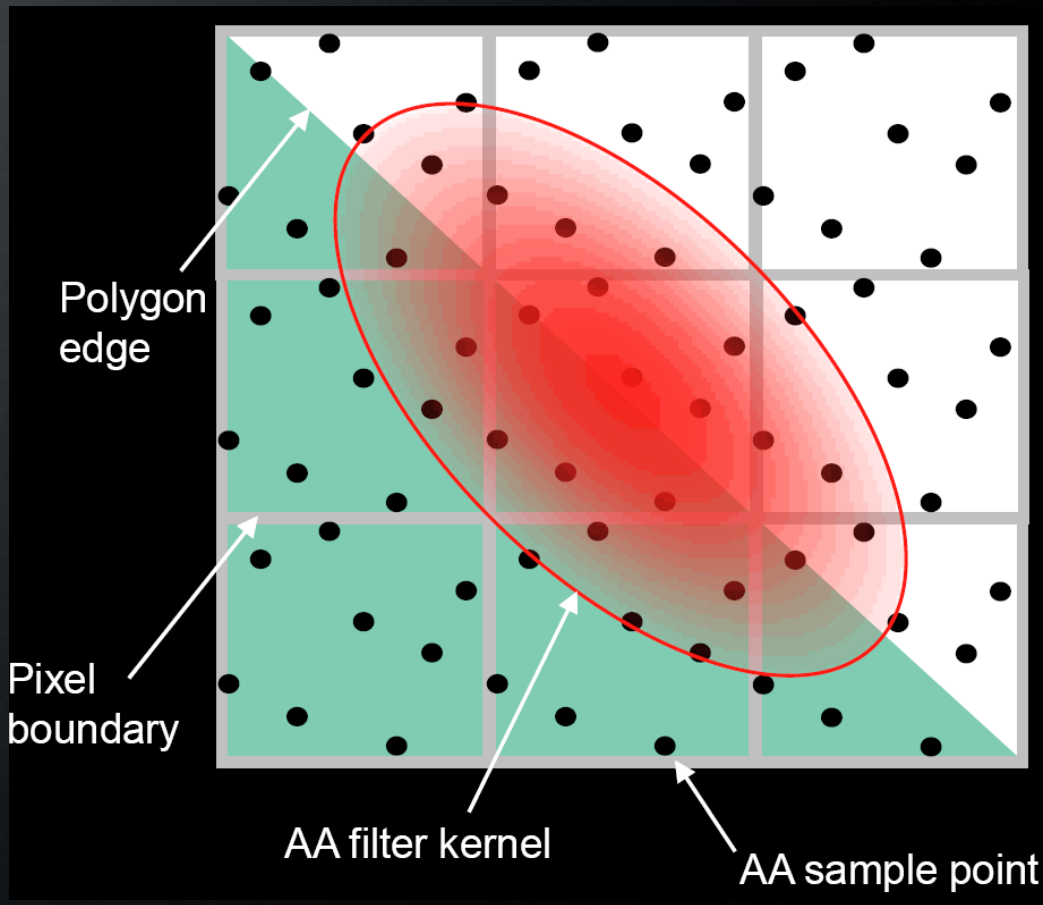
AA performance per mm2

  - Doubled peak rate for depth/stencil ops to64 per clock
  - Doubled AA fill rate for 32-bit & 64-bit color
  - Doubled non-AA fill rate for 64-bit color
- Supports both fixed function (MSAA) and programmable (CFAA) modes



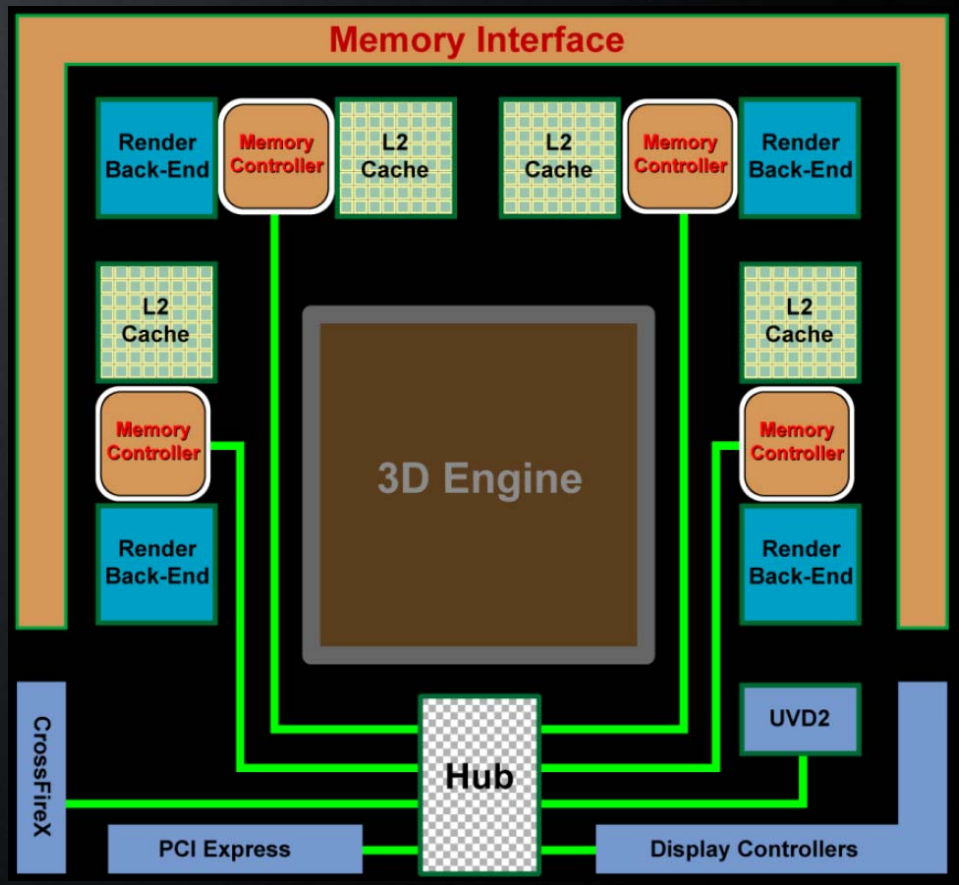
# Edge Detect Custom Filter AA

- Enhanced edge-detect filter delivers 12x & 24x CFAA modes
- Avoids blurring by taking additional samples along edges, not across them
- Same memory footprint as 4x & 8x MSAA
- Works with Adaptive AA



# Memory Controller Architecture

- New distributed design with hub
- Controllers distributed around periphery of chip, adjacent to primary bandwidth consumers
- Hub handles relatively low bandwidth traffic
  - PCI Express, ATI CrossFireX™ interconnect, UVD2, display controllers, intercommunication



# AMD Stream Computing




AMD
The future is fusion

# Stream Software Development Kit
## High-level Development Tools

Brook+

- High-level language, C extensions for the GPU
- Based on Brook from Stanford; AMD enhancements will be open-sourced

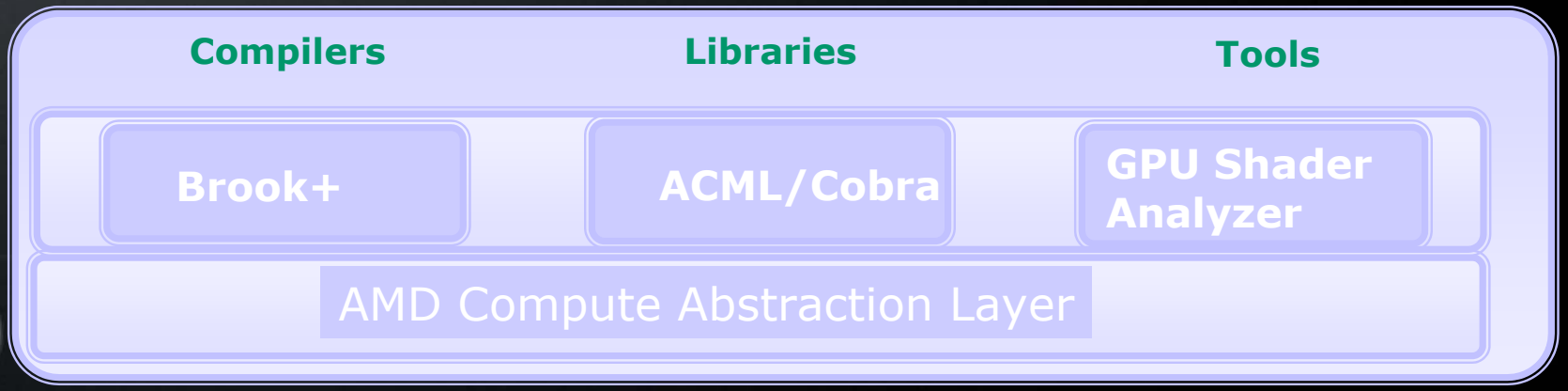
Libraries

- AMD's math library ACML provides GPU-accelerated math functions

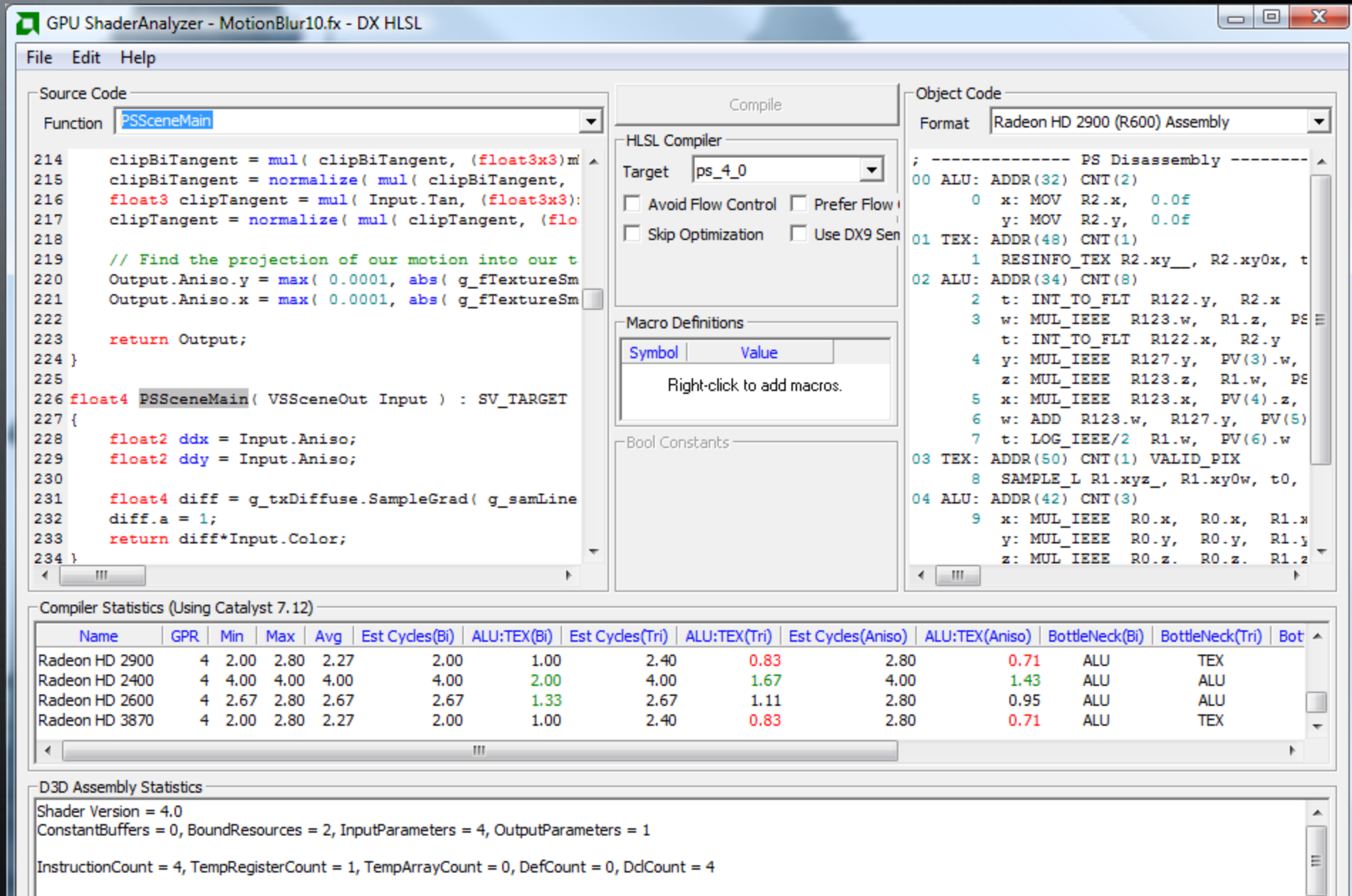
Tools

- GPU Shader Analyzer
- AMD Code Analyst

- AMD Compute Abstraction Layer



# GPU ShaderAnalyzer



# AMD Stream Computing

- Documentation
- Developer Forum
- A clear path to OpenCL and DirectX® 11
- Continued support for Brook+/CAL/IL

# Next Generation GPUs

# Direct3D 11

- Tessellation
  - Hull Shader
  - Domain Shader
  - Tessellator
- Compute Shader
  - Compute Shader on DirectX® 10
  - Integrated with Direct3D
  - Enables broad installed base
- DirectX® 11 on Windows Vista®

# OpenCL

- Expecting something to play with in Q1 2009
- Approachable language for accessing heterogeneous computational resources
- Supports parallel execution on single or multiple processors
  - GPU, CPU, GPU + CPU or multiple GPUs
- Based on a subset of ISO C99 with extensions
- For more information see Aaftab Munshi's OpenCL slides in 'Beyond Programmable Shading' course at SIGGRAPH2008

# GPU research

- Compute
  - Game Physics/AI
  - Many challenges in Architecture and Software
  - Hetergeneous Computing/Accelerated Computing, CPU + GPU
    - Software layers

# Conclusion

- ATI Radeon™ HD 4800 series
  - Teraflop processing power
  - High performance/$
- Brook+/CAL for compute programming
- Direct3D 11, OpenCL

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