



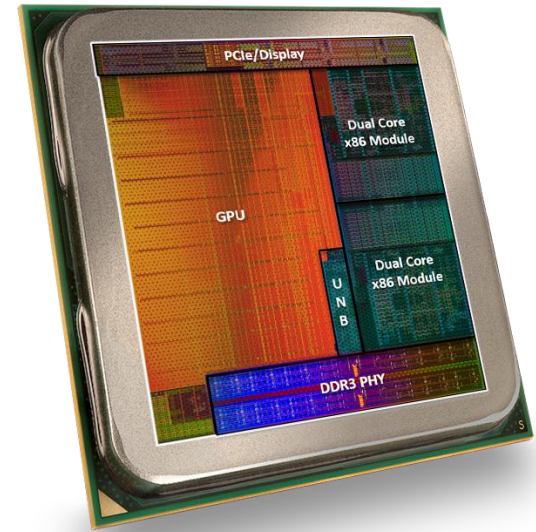
HETEROGENEOUS PARALLEL PROCESSING DIRECTIONS

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APU: ACCELERATED PROCESSING UNIT

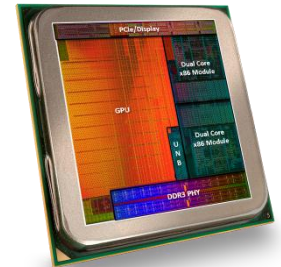
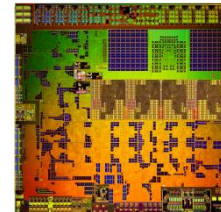
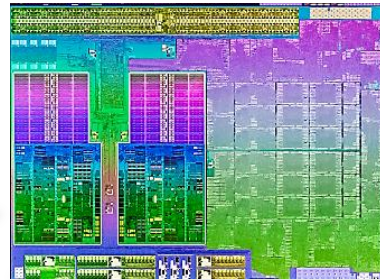
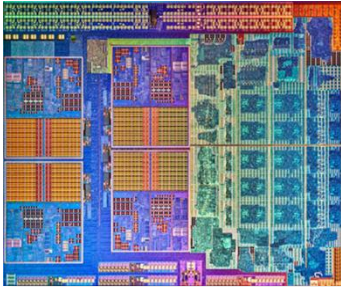


- ▲ The APU provides significant benefits over previous platforms
- ▲ Combines scalar processing on CPU with parallel processing on the GPU and high bandwidth access to memory
- ▲ How do we make it even better going forward?
 - Easier to program
 - Easier to optimize
 - Easier to load balance
 - Higher performance
 - Lower power



EVOLVING THE APU:

EVOLUTION FOR BETTER COMPUTE, ENTERTAINMENT, & PC EXPERIENCES



2011 APUs

- ▲ World's first design with multi-core x86 and discrete-level GPU on single die
- ▲ Radeon Memory Bus and Fusion Compute Link
- ▲ AMD A-Series and AMD E-Series for PCs, G-Series for Embedded

2012 APUs

- ▲ New generations of x86 and GPU IP incorporated
- ▲ Dedicated video encode/decode
- ▲ New AMD A-Series for PCs, R-Series for Embedded

2013 APUs

- ▲ First full System-on-Chip APUs¹
- ▲ First tablet APUs²
- ▲ New AMD G-Series Embedded SOC
- ▲ World's first Server APUs³
- ▲ World's first Semi-Custom APUs⁴

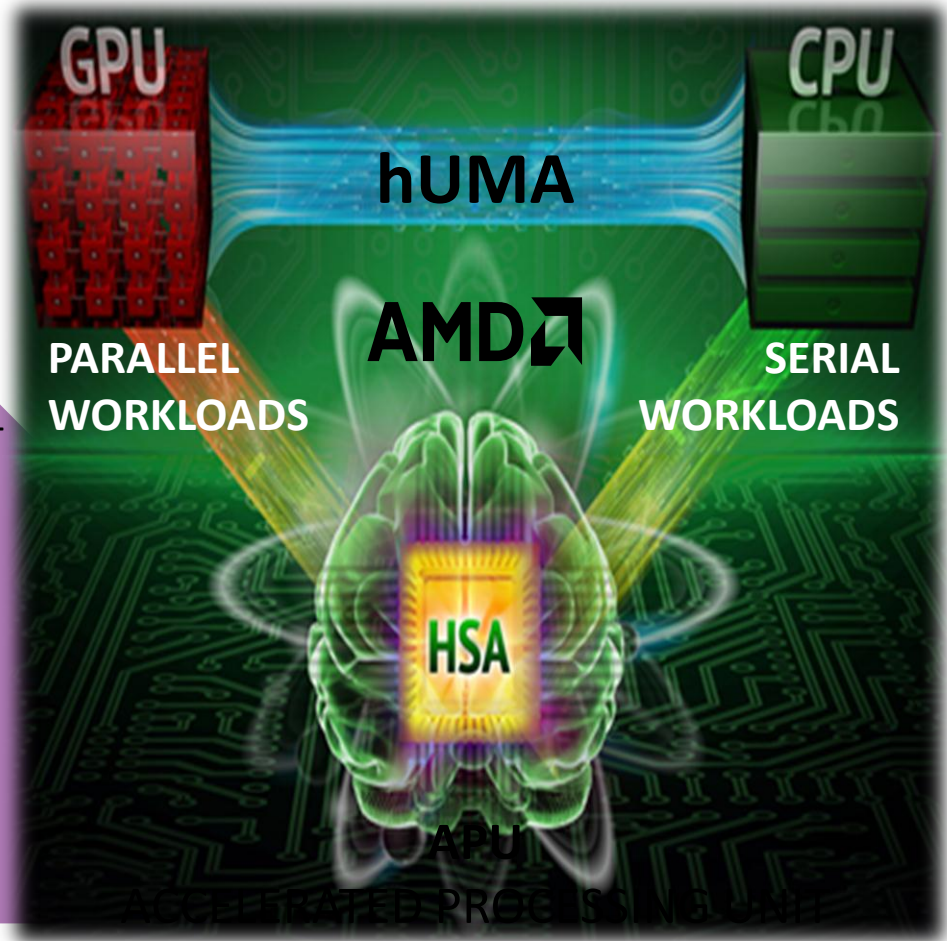
2014 – HSA Support

- ▲ Coherent address space
- ▲ User model kernel queuing and dispatch
- ▲ Enables efficient OpenMP

WHAT IS HSA?



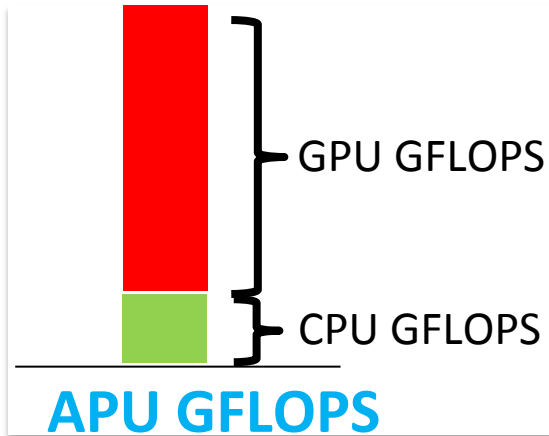
Processor design that makes it easy to harness the **entire computing power of an HSA-enabled APU** for faster and more power-efficient devices.



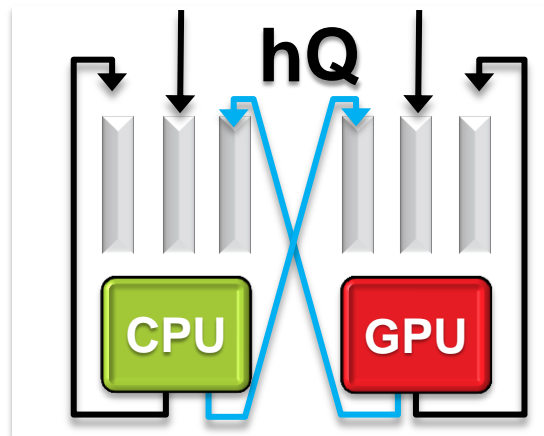
HSA: REVOLUTIONARY ARCHITECTURE



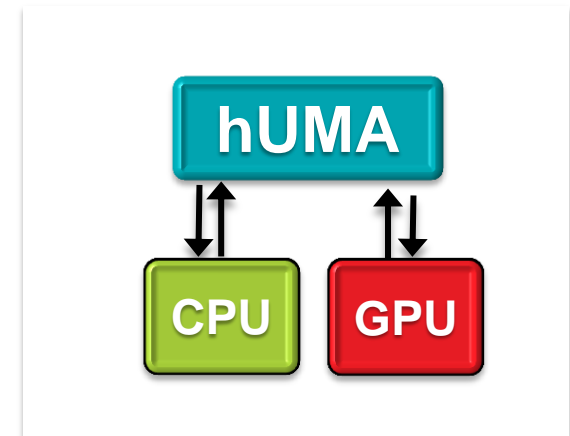
UNLOCKING All APU GFLOPS



ALL-PROCESSORS- EQUAL



EQUAL ACCESS TO ENTIRE MEMORY

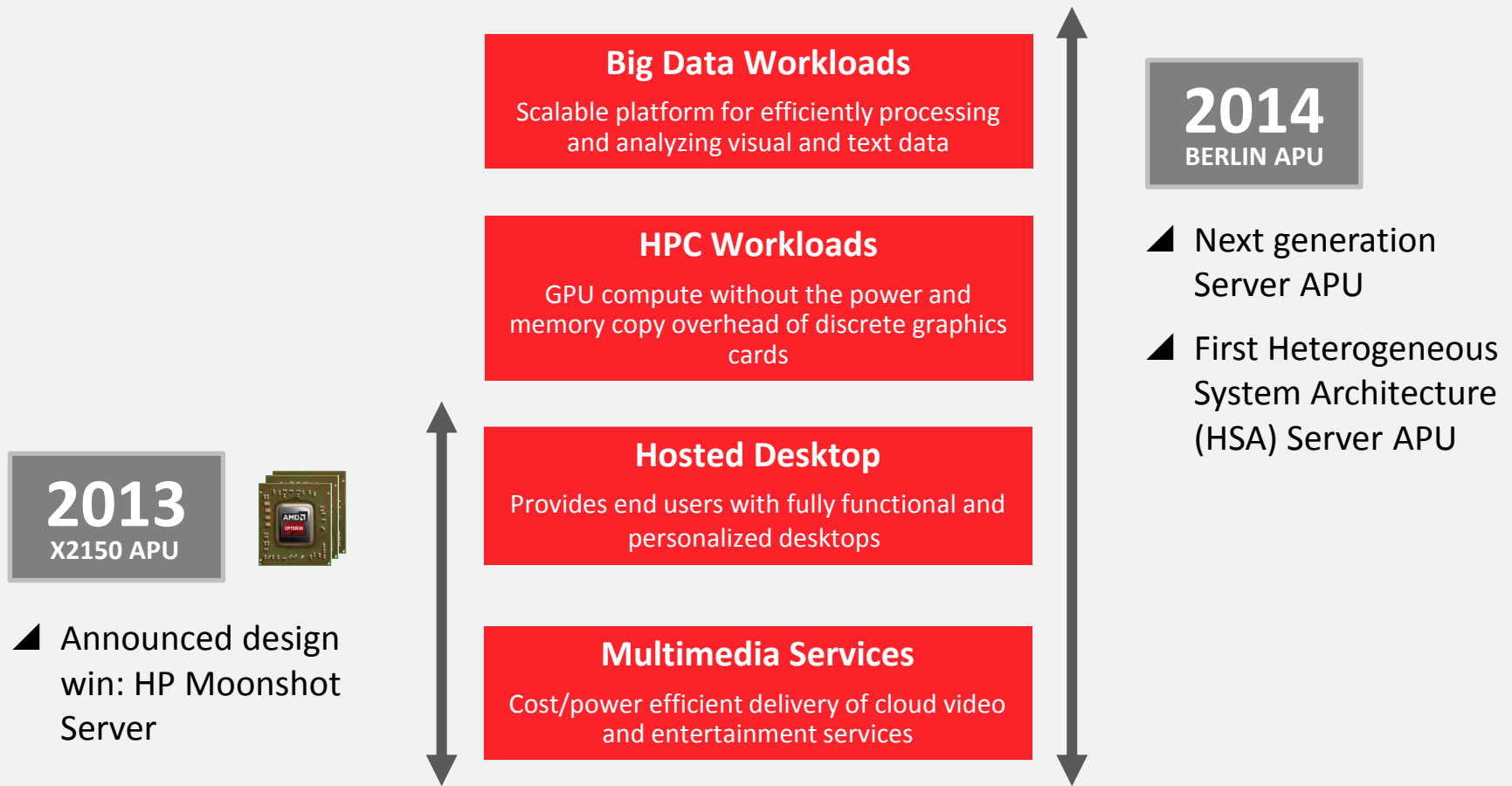


Access to full potential of
APU compute power

GPU and CPU have equal
flexibility to create and
dispatch work items

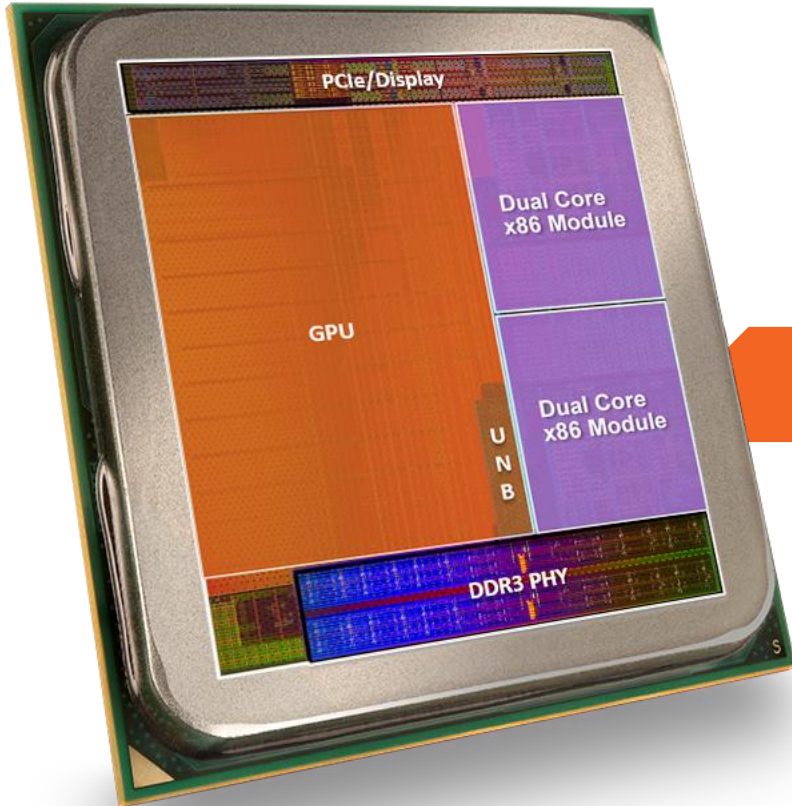
GPU and CPU have
uniform visibility into
entire memory space

HYPERSCALE EFFICIENCIES FOR DENSE COMPUTING CLUSTERS



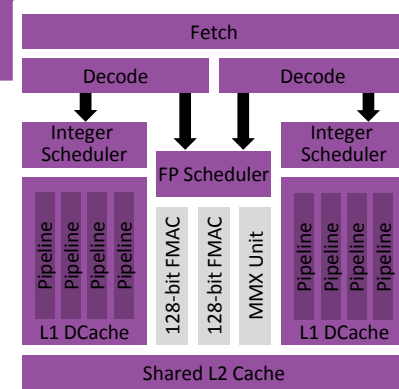
COMBINES BEST IN CLASS AMD RADEON™ HD GRAPHICS WITH X86 TECHNOLOGY

“KAVERI” FEATURING UP TO 4 CPU + 8 GPU CORES



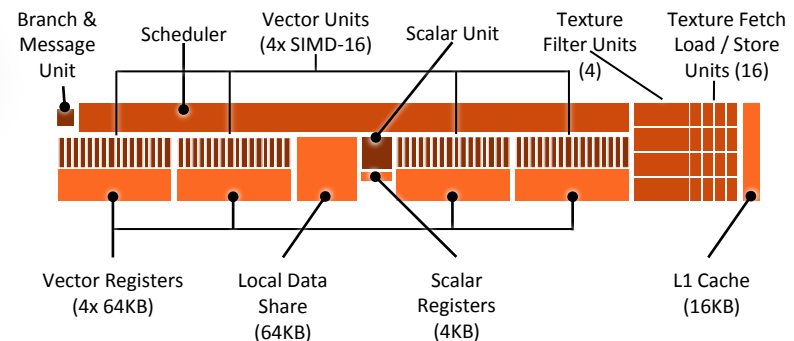
CPU COMPUTE CORES

Up to four new multi-threaded AMD “Steamroller” CPU CORES



GPU COMPUTE CORES

Up to eight GCN GPU CORES powering parallel compute and next-gen gaming



AMD Research



▲ FastForward Program

- Started July, 2012 with a total of \$12.6M in DOE funding
- Two research areas
 - Heterogeneous processors
 - Next generation memory systems

▲ DesignForward Program

- Started November, 2013 with a total of \$3.1M in DOE funding
- Research interconnect architecture to take HSA to network level

AREAS OF INTEREST



- ▲ Additional analytics research, particularly time sensitive analysis
- ▲ Predictive performance for next generation APUs (models and simulators)
- ▲ Acceleration architectures

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