News from the Embedded GPU Space
Robert Foss

@memcpy_io
Vendors
Vendors
Vendors

Intel

Kernel and Mesa

2009

Gen6 Sandy Bridge
Gen7 Ivy Bridge
Gen9 Skylake
Gen8 Broadwell

2020

Gen10 Cannonlake
Gen11 Ice Lake
Iris Gen8+
Gen12 Tiger Lake

Collabora
Open First
Vendors

AMD

Intel
Vendors

AMD

Intel

NVIDIA
Vendors

NVidia

Reverse Engineering

2009

Fermi
Kepler
Tegra
Maxwell
Pascal
Volta
Turing

2020
Vendors

NVidia

Reverse Engineering

Kernel and Mesa

2009

Fermi
Kepler Tegra
Maxwell
Pascal Volta
Turing

2009

Driver added
Fermi
Kepler
Maxwell
Pascal
Volta
Turing

2020

2009

2020
Vendors

AMD

Imagination

Intel

NVIDIA
Vendors

- AMD
- Imagination
- Intel
- NVIDIA
- Qualcomm

Collabora

Open First
Vendors

Qualcomm

Reverse Engineering
Vendors

- AMD
- Broadcom
- Imagination
- Intel
- NVIDIA
- Qualcomm
Vendors

Broadcom

Kernel and Mesa
Vendors

- AMD
- Broadcom
- Imagination
- Intel
- NVIDIA
- Qualcomm
- Vivante
Vendors

Vivante

Reverse Engineering

2009

Initial commit
GC2000

GC3000

GC7000

2020
Vendors

Vivante

Reverse Engineering

2009 Initial commit GC2000 GC3000 GC7000 2020

Kernel and Mesa

2009 Driver added GC2000 GC3000 GC7000 2020
Vendors

Vivante

Etnaviv GC3000

Vivante GC3000

glmark2 score
Vendors

AMD

arm

BROADCOM

Imagination

intel

NVIDIA

QUALCOMM

VIVANTE
What Comes Next
Compute

- OpenCL
Compute

• OpenCL
  - Qualcomm & freedreno support in progress
  - NVidia & nouveau support in progress
  - Vivante & etnaviv support in progress
Compute

• OpenCL
  - Qualcomm & freedreno support in progress
  - NVidia & nouveau support in progress
  - Vivante & etnaviv support in progress

• Vulkan Compute
  - Supported by Intel and AMD
Compute

• OpenCL
  – Qualcomm & freedreno support in progress
  – NVidia & nouveau support in progress
  – Vivante & etnaviv support in progress

• Vulkan Compute
  – Supported by Intel and AMD

• SYCL
  – High level & built on top of OpenCL
Big Picture
Some drivers are very mature
Big Picture

- Some drivers are very mature
- Community drivers share common codebase
Big Picture

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• Community drivers share common codebase
• Reverse engineering takes 0-7 years
Big Picture

- Some drivers are very mature
- Community drivers share common codebase
- Reverse engineering takes 0-7 years
- Compute still on the way
Why Open Source?
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- Long-term support
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• Long-term support
  - Up to 20 year old drivers currently supported
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- High performance & conformance
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- High performance & conformance
- Much simpler debugging
Why Open Source?

- Long-term support
  - Up to 20 year old drivers currently supported
- High performance & conformance
- Much simpler debugging
- Old hardware receives new features
Thank you!