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Running Android on the Mainline Graphics Stack

Robert Foss

Software Engineer

robert.foss@collabora.com

Open First

Agenda

- Why does this matter?
- Android Graphics Stack
- Open Source Graphics Stack
- Current Status

Why?



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Why?

Get the latest kernel features



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Why?

Get the latest kernel features

- Security fixes



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Why?

Get the latest kernel features

- Security fixes
- New features

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- Security fixes
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- Bug fixes

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- Security fixes
- New features
- Bug fixes
- Increased performance



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Why?

Get the latest kernel features

- Security fixes
- New features
- Bug fixes
- Increased performance
- Lower power usage



Why?

Long term support



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Why?

Long term support

- Deliver products with >10 years lifespan



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Why?

Long term support

- Deliver products with >10 years lifespan
- Support can be provided from anywhere



Why?

Long term support

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Why?

Long term support

- Deliver products with >10 years lifespan
- Support can be provided from anywhere
- Hardware support even if the vendor disappears



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Why?

Support multiple vendors

- Support multiple hardware vendors with one stack

Why?

Support multiple vendors

- Support multiple hardware vendors with one stack
- Switch hardware vendor at will

Android Graphics Stack



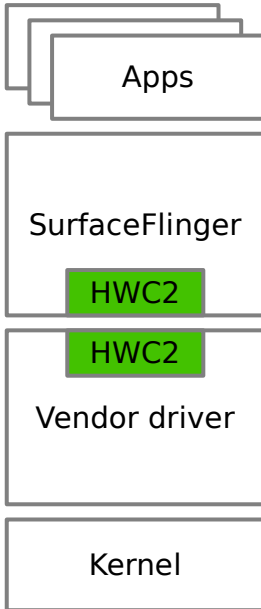
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Android Graphics Stack



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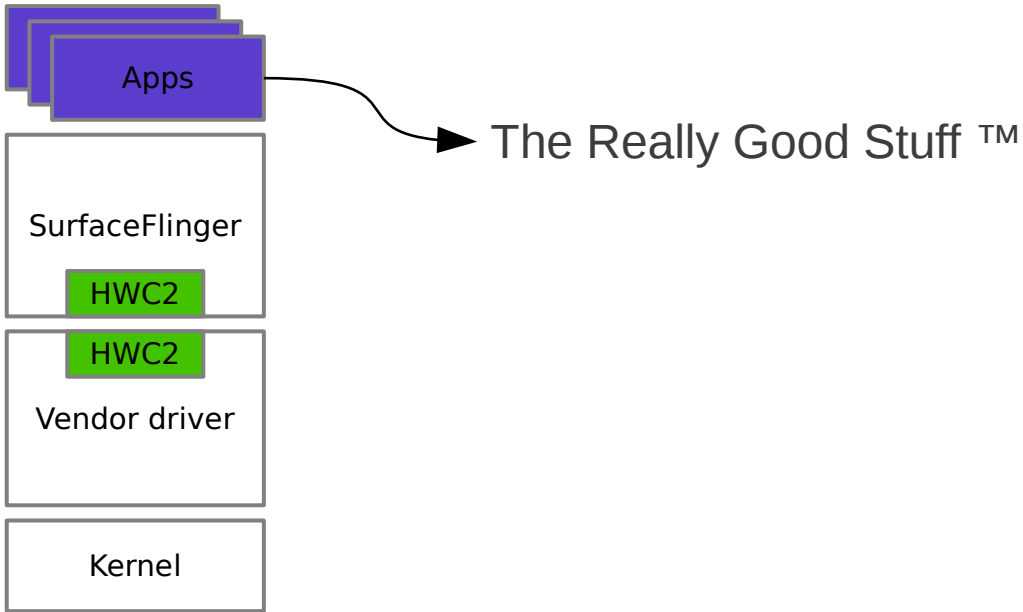
Android Graphics Stack





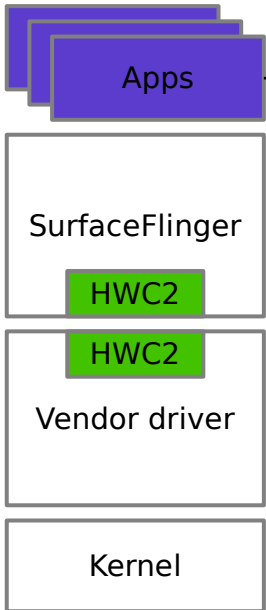
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Android Graphics Stack





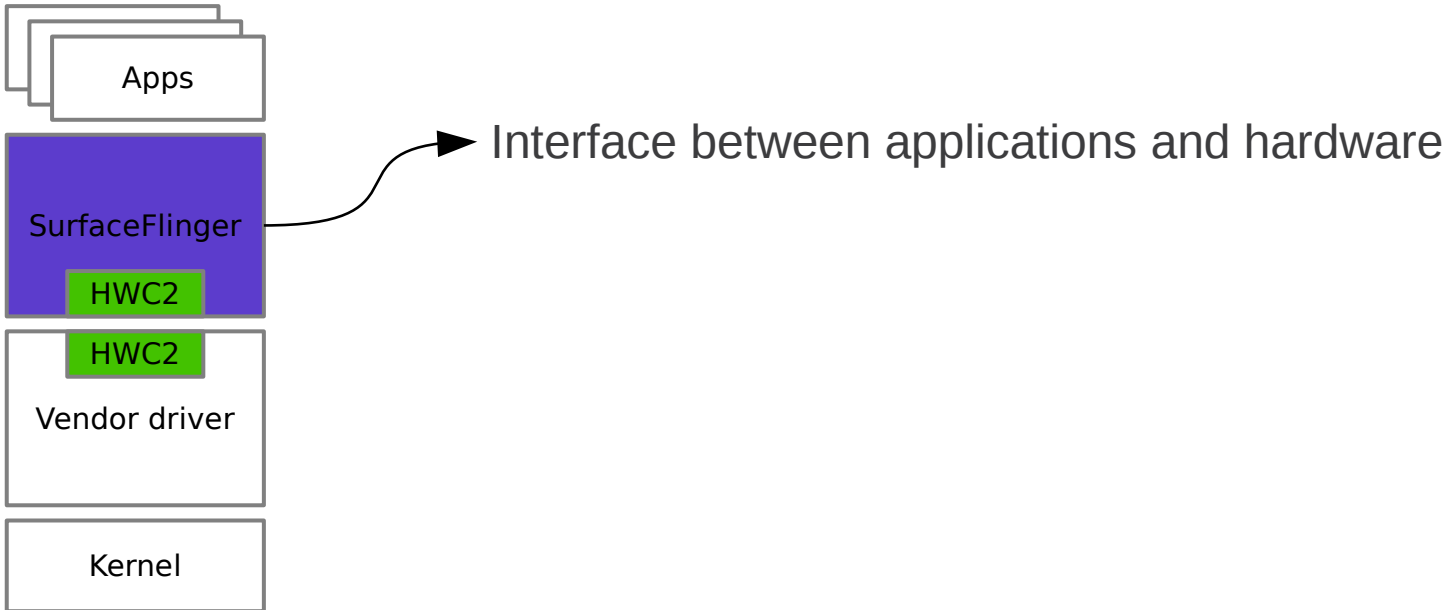
Android Graphics Stack



→ The Really Good Stuff™
- No really, this is the whole point!



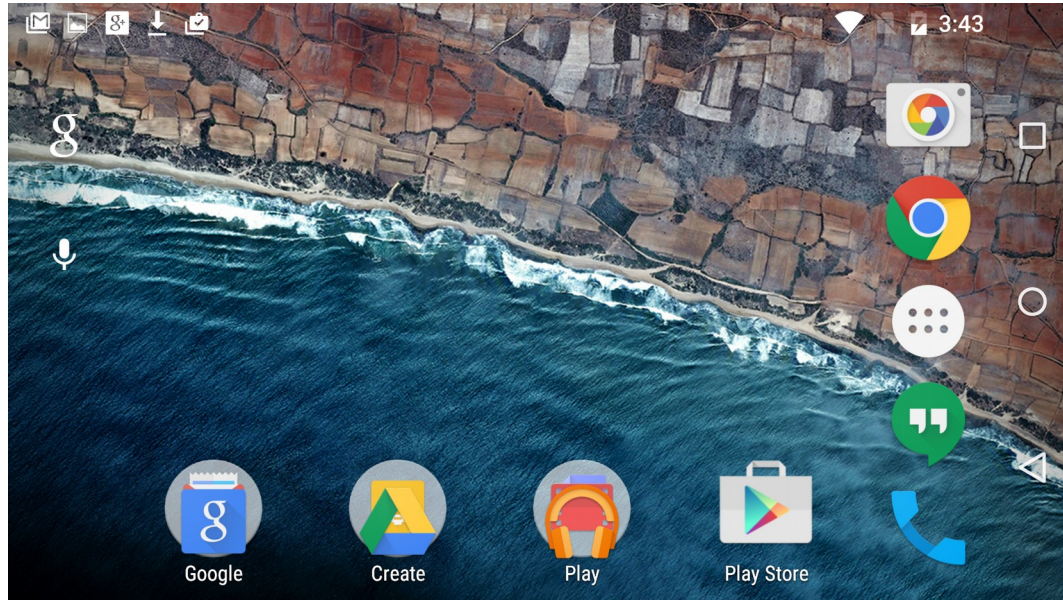
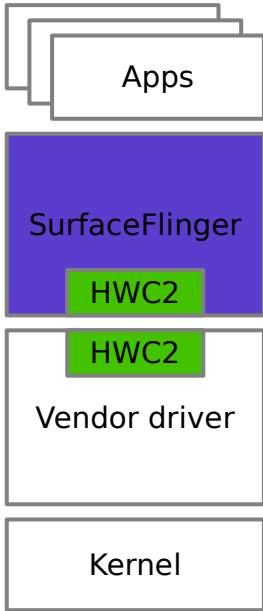
Android Graphics Stack





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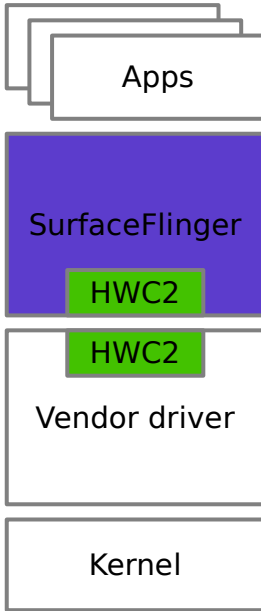
Android Graphics Stack



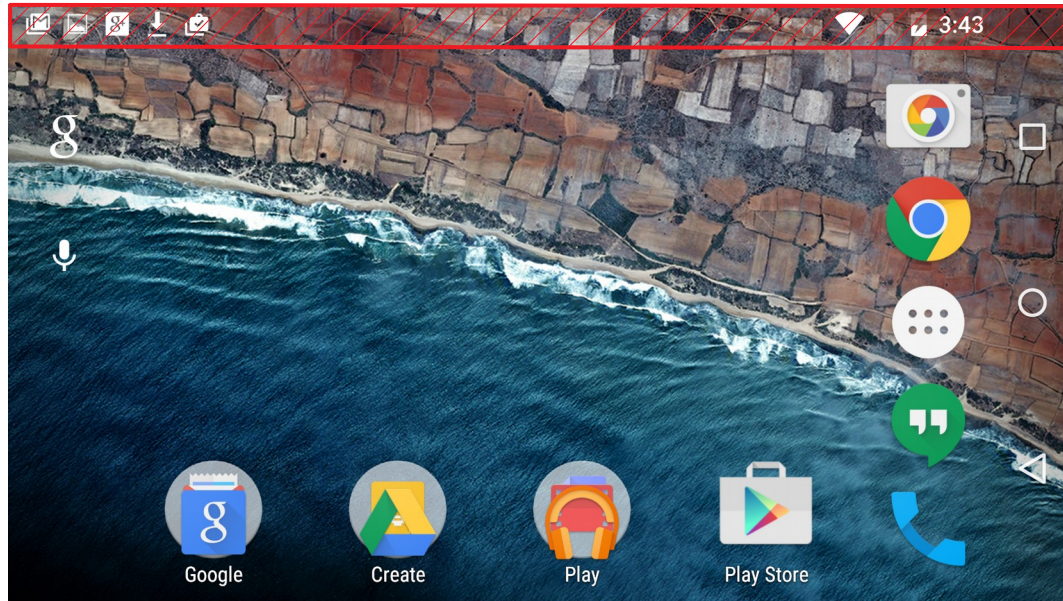


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Android Graphics Stack



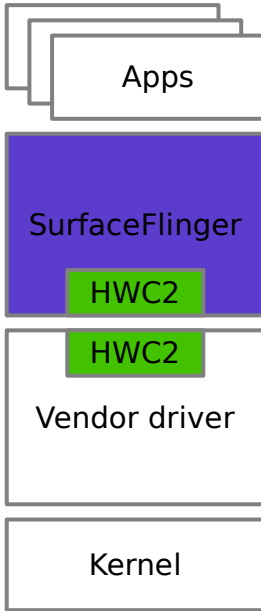
Status Bar



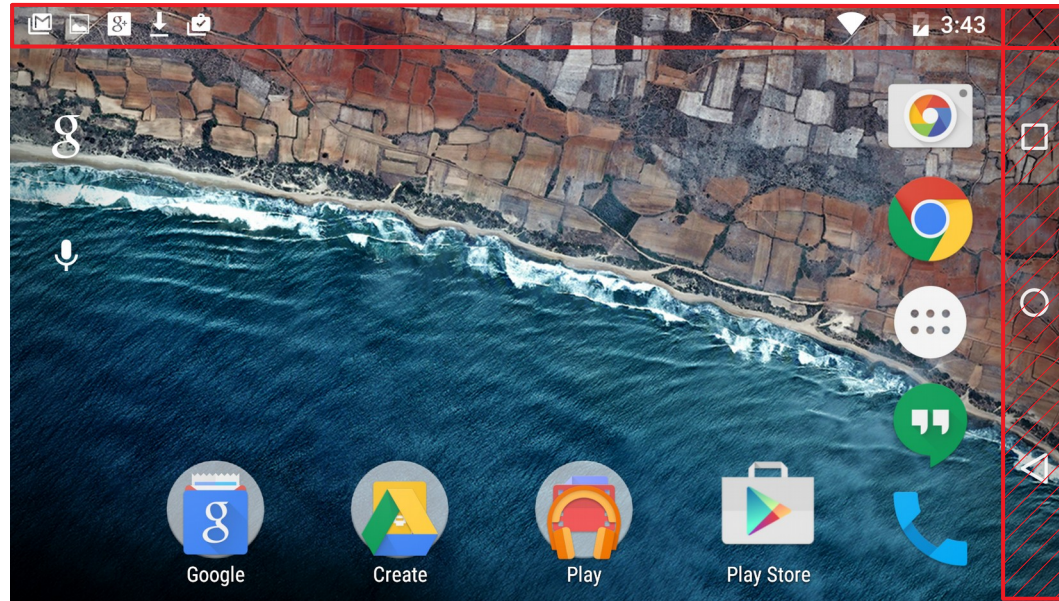


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Android Graphics Stack



Status Bar

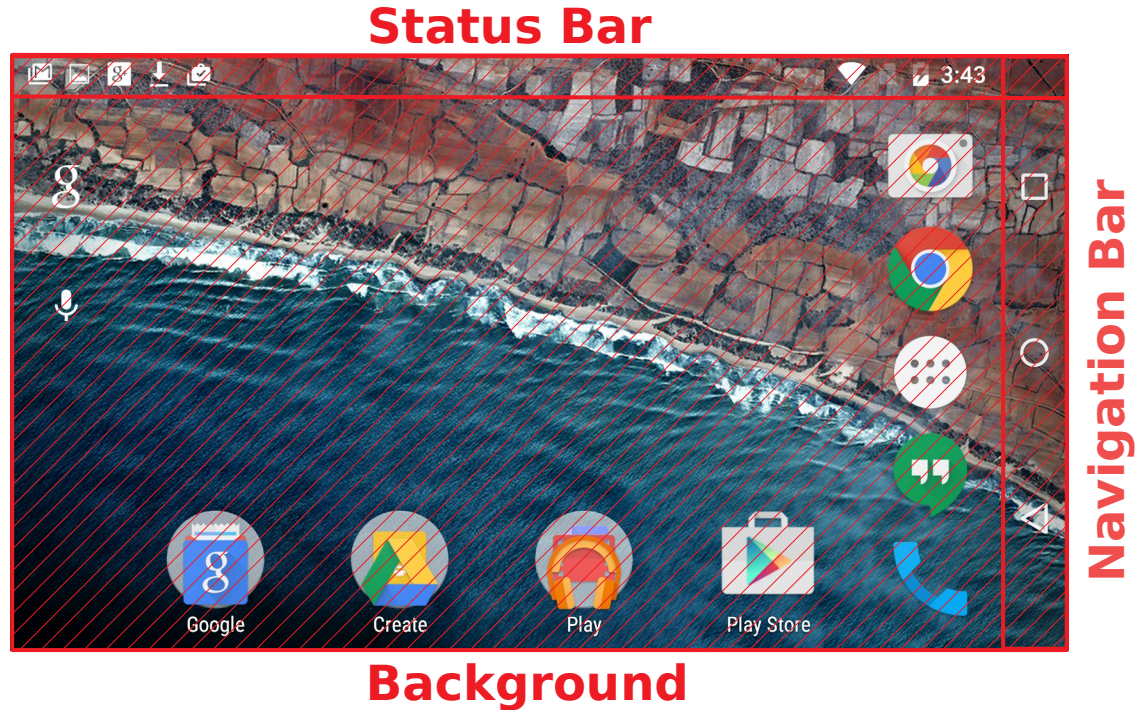
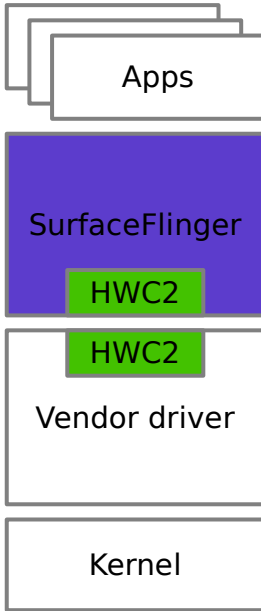


Navigation Bar



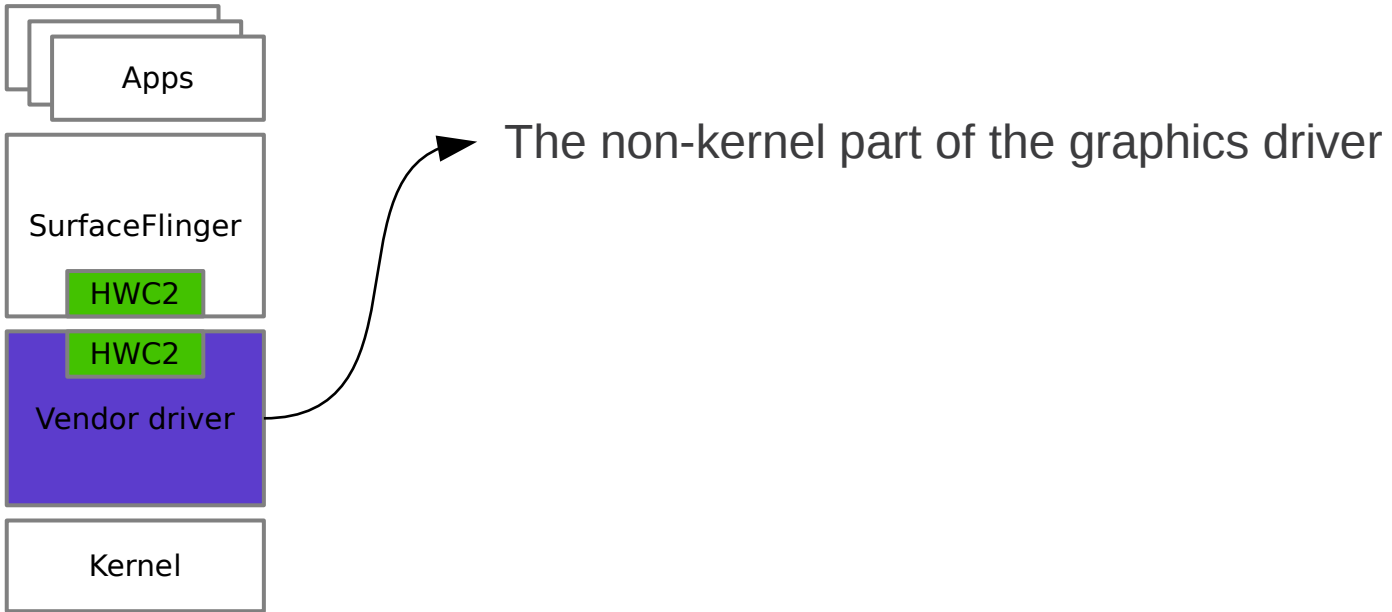
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Android Graphics Stack



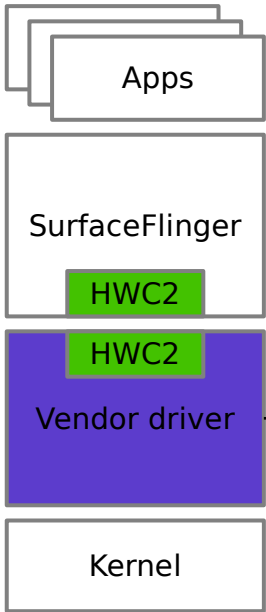


Android Graphics Stack





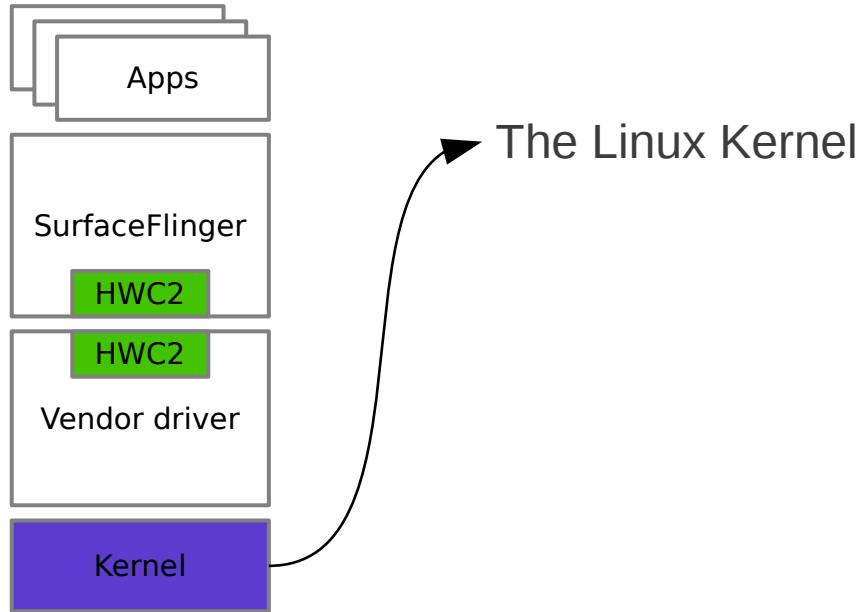
Android Graphics Stack



The non-kernel part of the graphics driver
- OpenGL, Vulkan, memory allocator, etc.



Android Graphics Stack

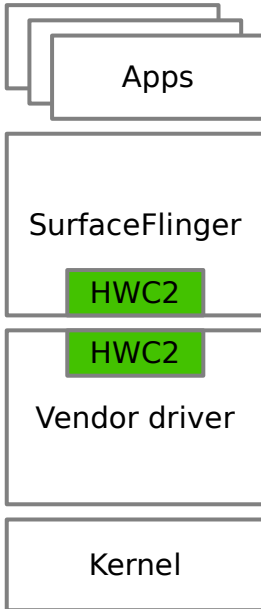




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Android Graphics Stack

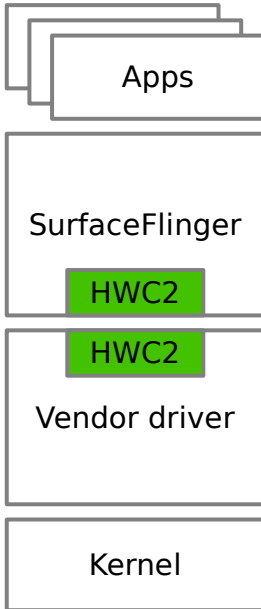
What's the HWC2 API?





Android Graphics Stack

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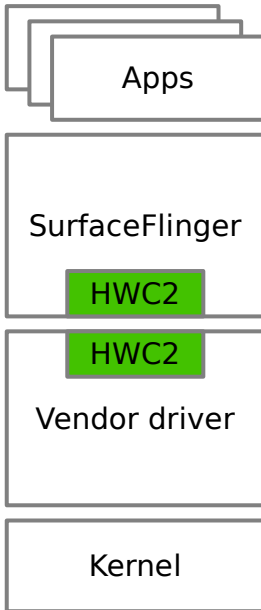


- API used between SurfaceFlinger and hardware



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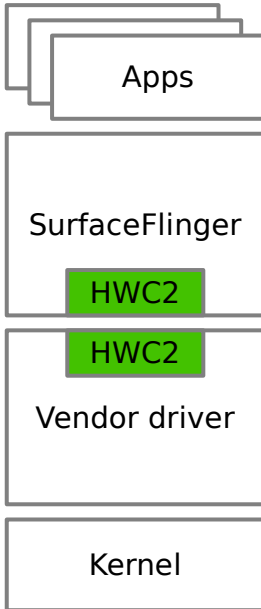


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- Compose layers to the screen



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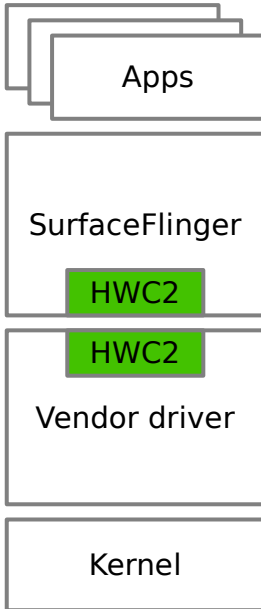


- API used between SurfaceFlinger and hardware
- Compose layers to the screen
- Abstract graphical objects



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What's the HWC2 API?



- API used between SurfaceFlinger and hardware
- Compose layers to the screen
- Abstract graphical objects
- Offload work from GPU to compositor hardware



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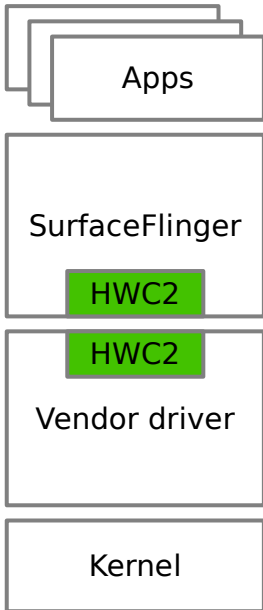
Open Source Stack



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Open Source Stack

Where does the OSS stack fit in?

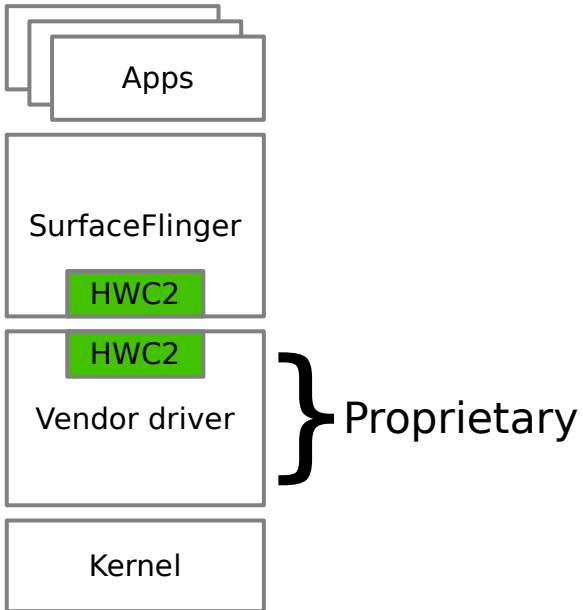




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Open Source Stack

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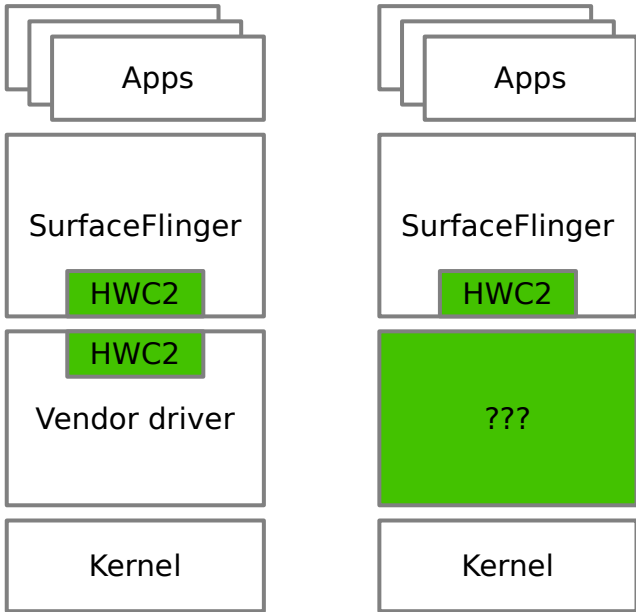




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Open Source Stack

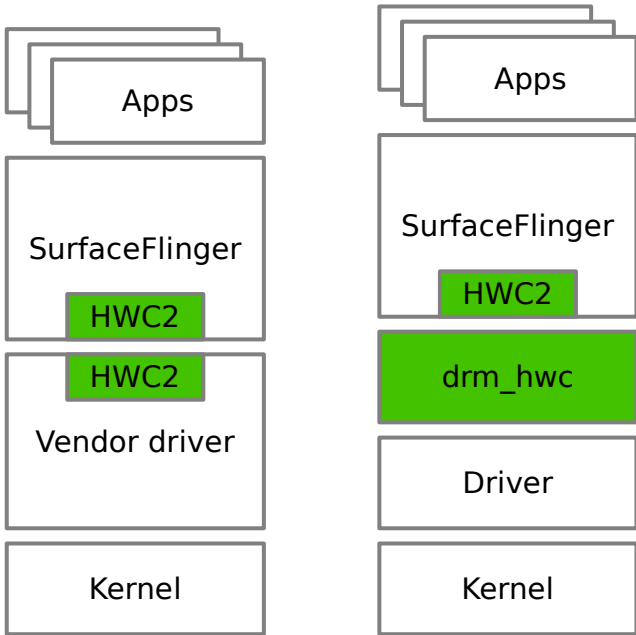
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Open Source Stack

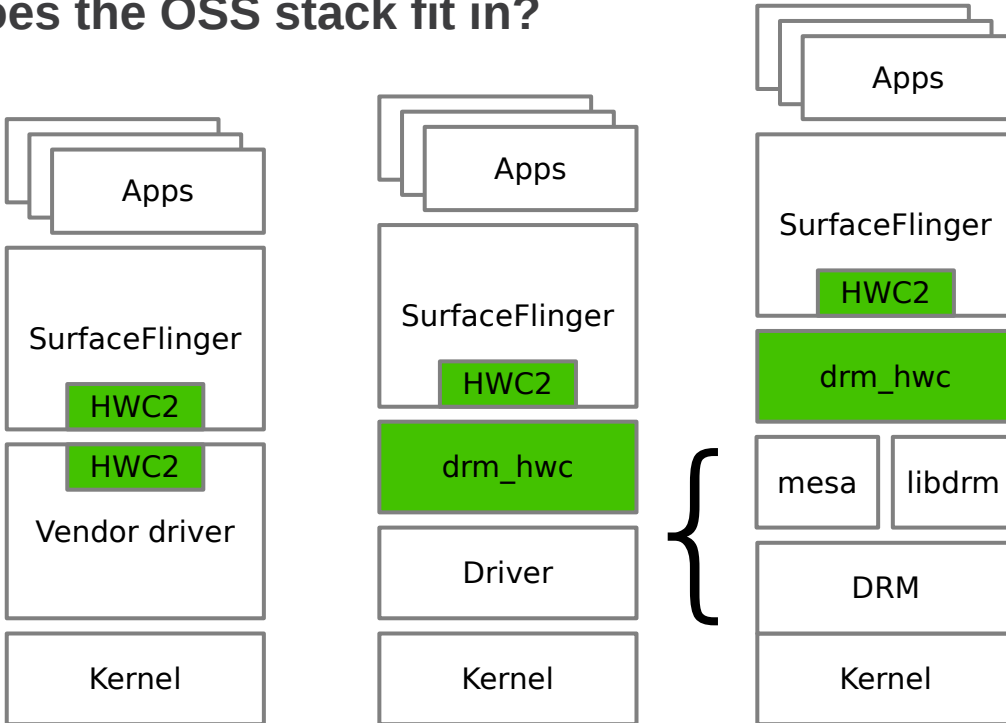
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Open Source Stack

Where does the OSS stack fit in?





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Current Status



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Current status

Why now?



Current status

Why now?

- Kernel Buffer Synchronization support
 - Inspired by Android kernels, now in mainline
 - Some GPU drivers now support this

Current status

Why now?

- Kernel Buffer Synchronization support
 - Inspired by Android kernels, now in mainline
 - Some GPU drivers now support this
- Atomic Display Framework API
 - Most drivers implement this



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Current status

Tested platforms

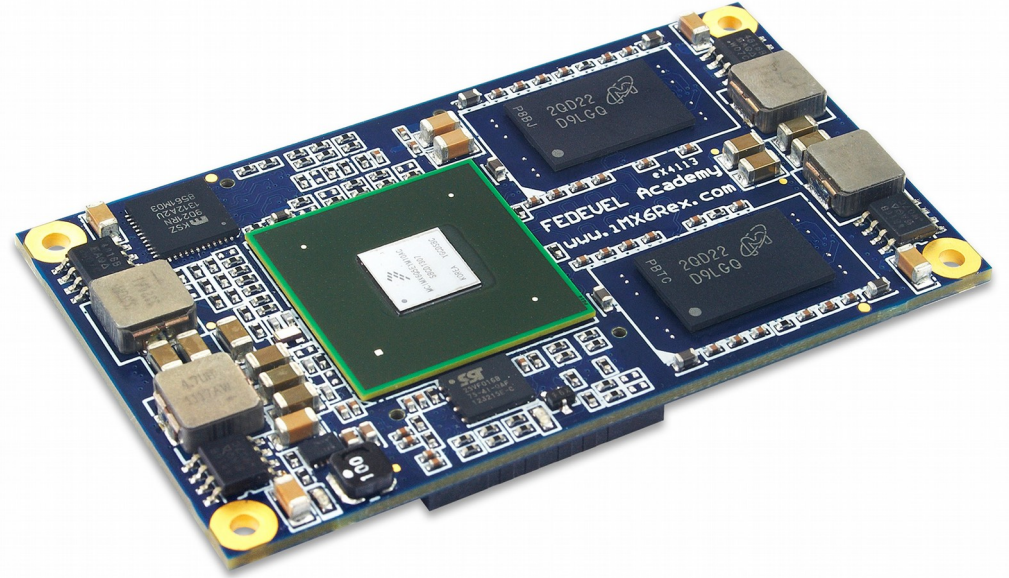


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Current status

Tested platforms

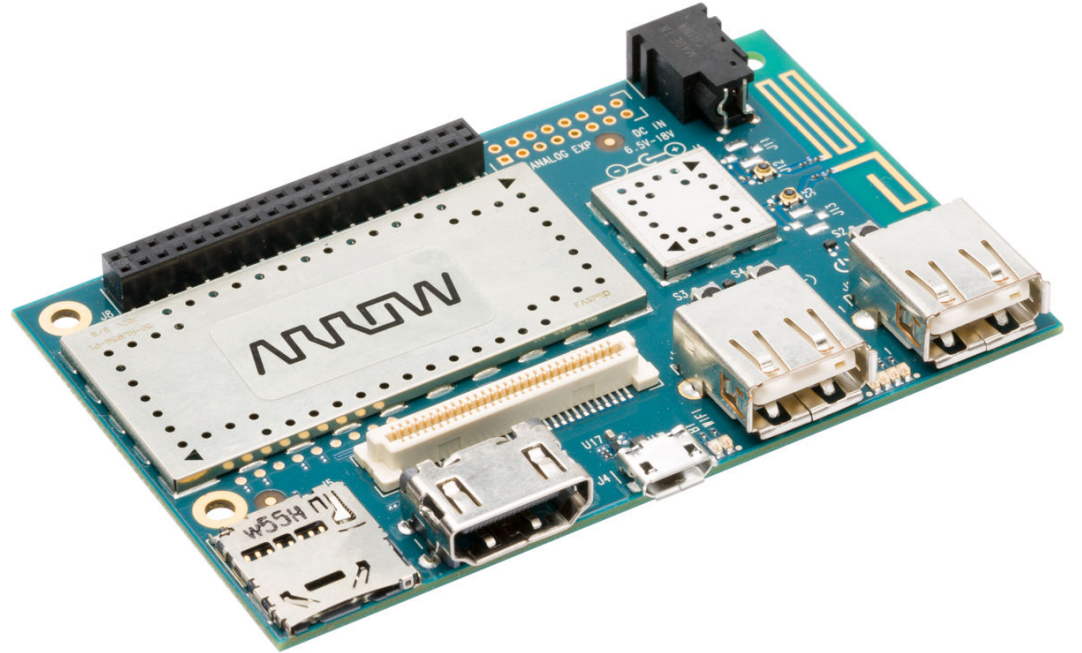
- iMX6
 - GPU: Vivante GC3000



Current status

Tested platforms

- Dragonboard 410c
 - GPU: Adreno 306



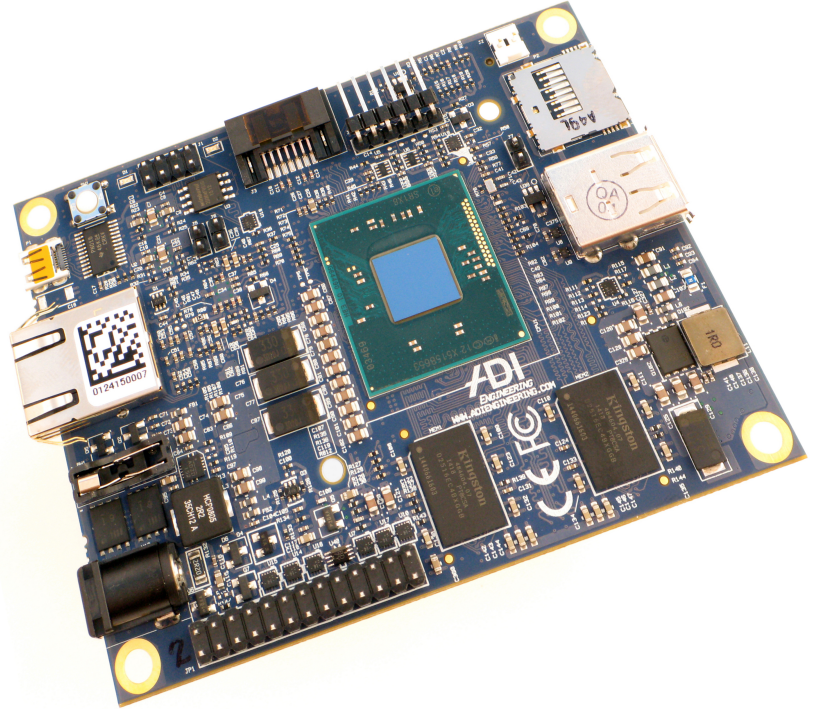


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Current status

Tested platforms

- MinnowBoard Turbot
 - GPU: Intel HD graphics





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Thank you!



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Questions?