

**moz://a**

# Firefox on Vulkan, D3D12, and Metal

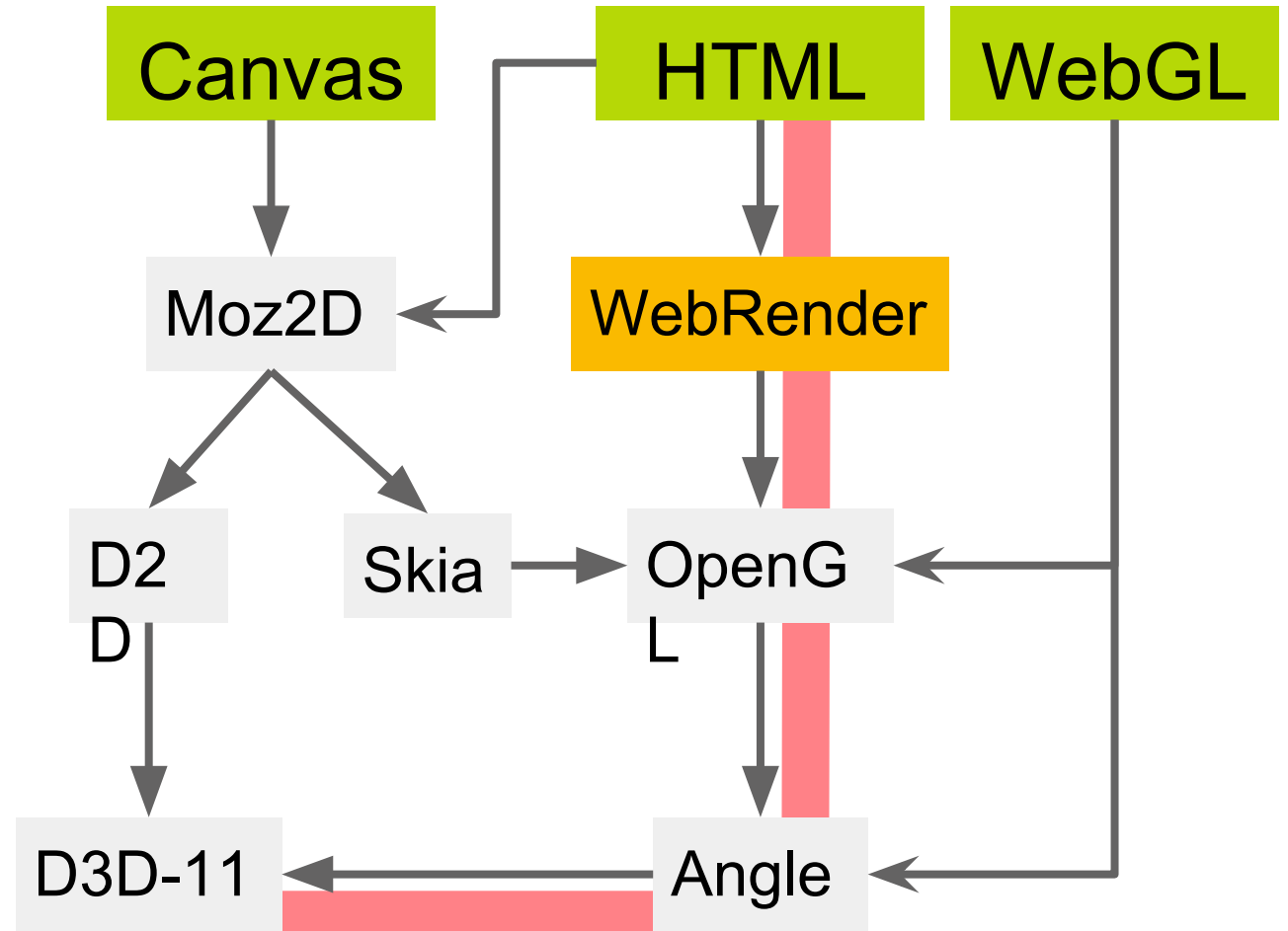
Taking advantage of the modern graphics APIs

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# Current WebRender-based rendering in Firefox

red line shows the critical  
path for page rendering



# Problems with OpenGL

.. an API with 25+ years of history in production

## Progressively Deprecated

- Apple made it official
- Khronos has Vulkan

## Outdated

The actual hardware went much ahead of the state, for which OpenGL was originally intended. We are paying for this:

- slower and bigger drivers
- limited parallelism
- limited features

## Implicit

Hard to control:

- when and what work is done by driver/GPU
- how/when memory is allocated

# Current WebRender pipeline

and the role of the GL driver

- DisplayList IPC
  - Scene Build
  - Build Frame
    - cull layers
    - fill batches
  - Render
    - record commands
    - manage memory
    - execute on GPU
    - wait for v-sync
- } WebRender
- } OpenGL Driver

# Next WebRender pipeline

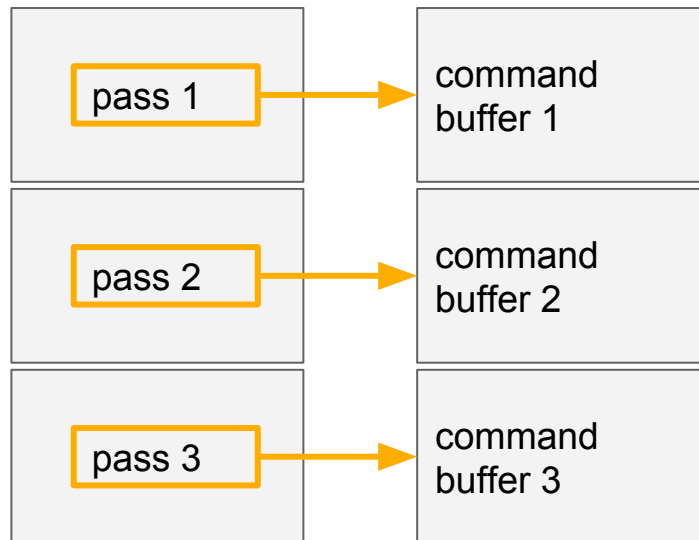
seizing the means of  
execution

- DisplayList IPC
  - Scene Build
  - Build Frame
    - cull layers
    - record commands
    - manage memory
  - Render
    - execute on GPU
    - wait for v-sync
- } WebRender

# Command Recording

## Next-gen APIs

Commands are recorded in independent command buffers separately, potentially on multiple threads.



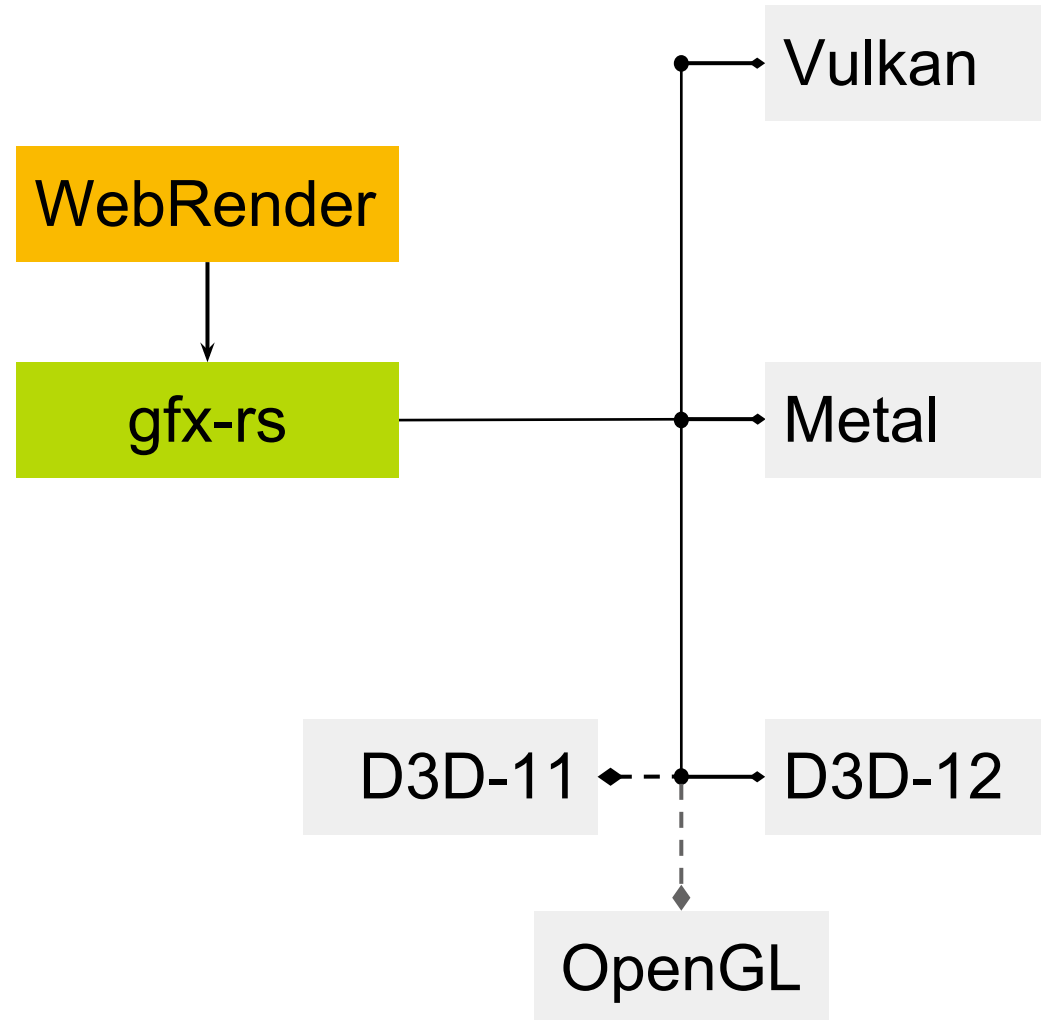
## OpenGL

Giant instanced arrays are constructed and then recorded into draw calls on the GPU context thread.



# Graphics Abstraction Library

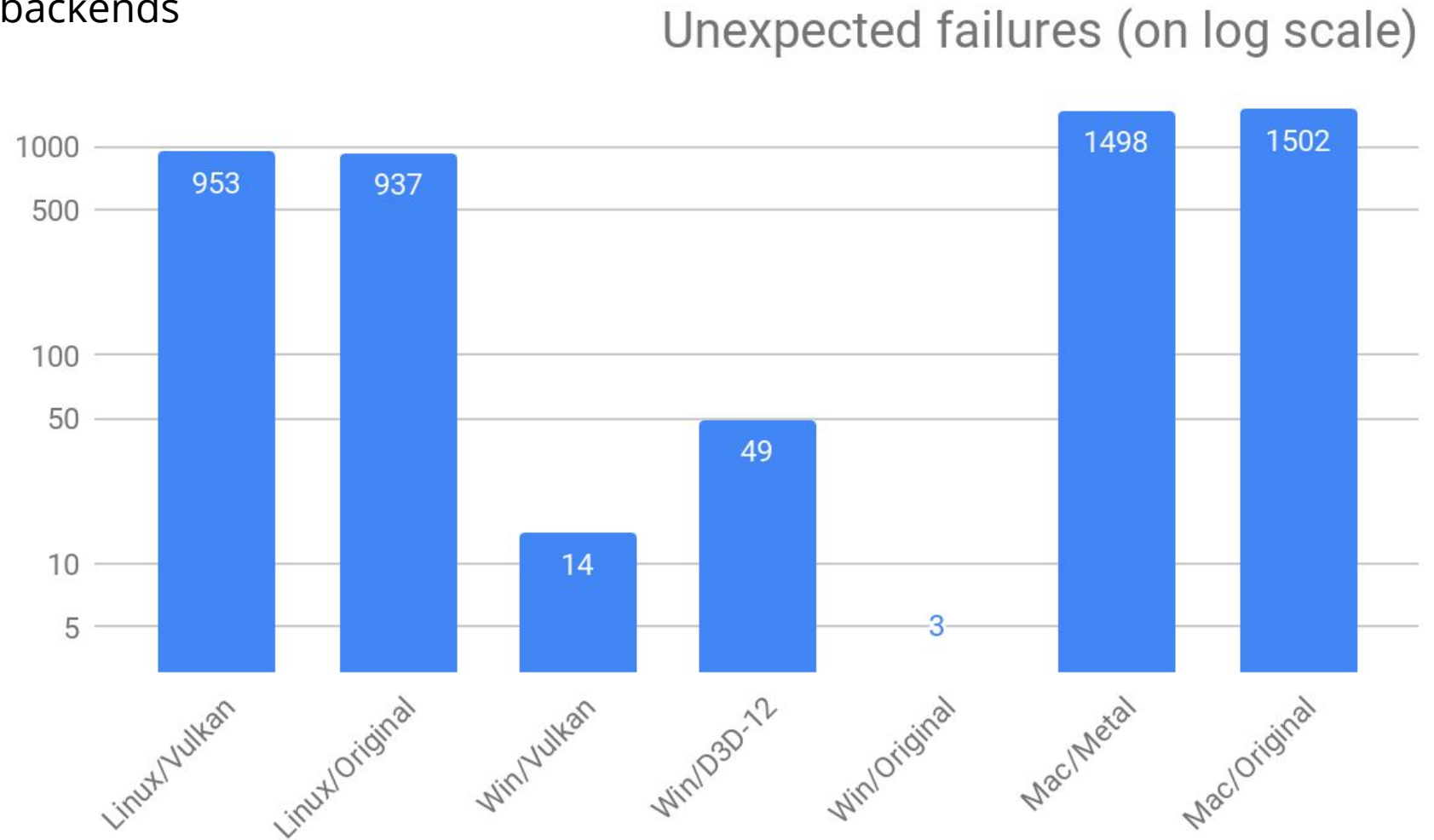
solution we need...



# Gecko Reftest Coverage

with experimental graphics backends

This chart roughly shows the readiness of backends to pass the reference tests.





# Thank you!

University of Szeged  
team

