A low latency GPU engine based reset mechanism for a more robust UI experience
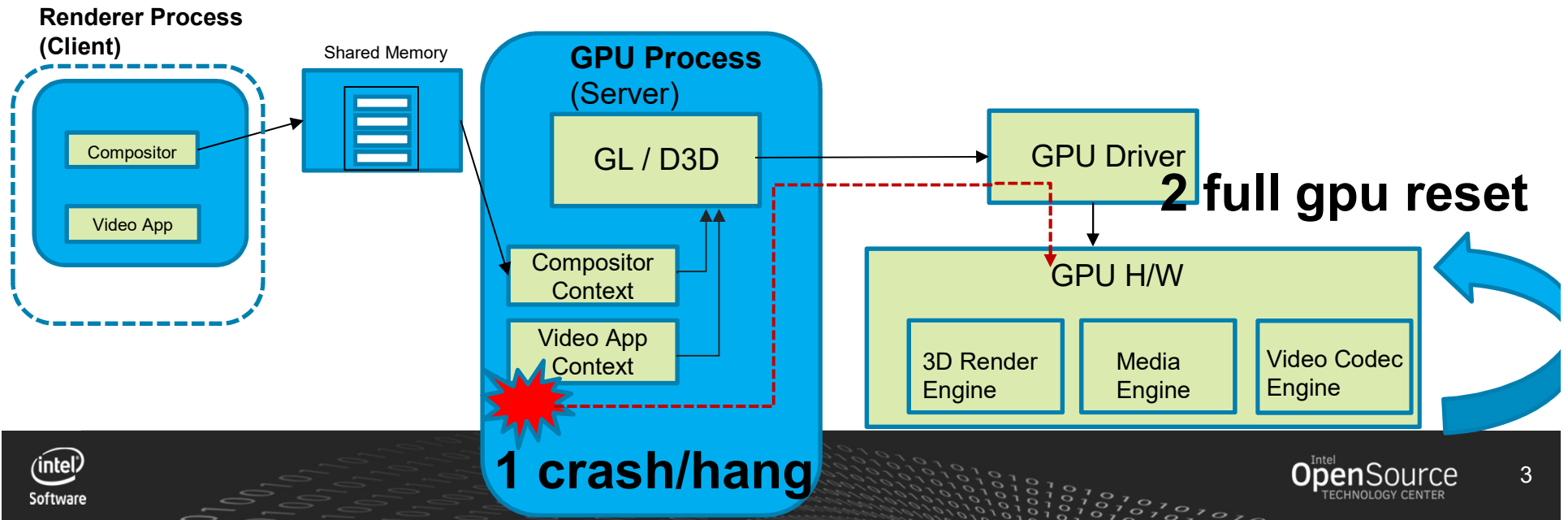
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Problem statement: Stability and Robustness

- Looking at a specific stability problem affecting the UI experience under Chrome OS under Intel Architecture when running gfx/video use case (video streaming type of app)

- The behavior was a **frozen UI**, followed by a **black screen** followed by **system reboot** (of course after some random time interval (hours to long long hours)).

- Spent some time understanding the GFX architecture in Chrome OS as well as a possible solution that could help here.

Current limitation

1. If a 3D client app "hangs" the GPU then the GPU process may get killed followed by a full GPU reset.

2. For a complex use case such as video decode many frames and objects are currently in flight so killing the GPU Process and resetting the GPU causes undesirables effects to the user including a frozen UI, black screen or a full system reboot.
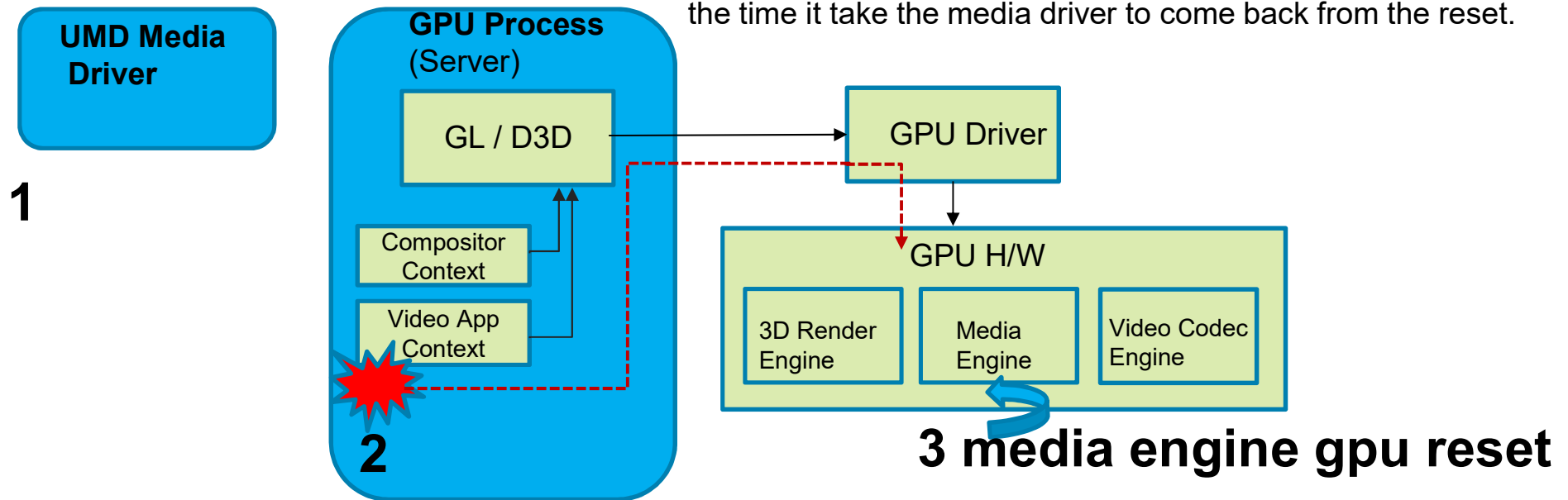
Proposed solution: TDR

- New feature for Intel GPUs (still not in upstream) that can increase both stability and robustness for any h/w accelerated compositors.

- **Timeout Detection** and **Recovery** (TDR) allows for the independent engines in the GPU to be reset independently (as opposed to a full GPU reset).

- The complete solution though still requires changes to be taken by a "**qualified**" user space media driver

Proposed solution:

1. UMD Media Driver starts the watchdog timer after sending batch buffers
2. At some time later the media engine is detected to be in hung state after the watchdog timer has expired
3. The GPU driver resets only the affected media engine
4. Because the UMD Media driver knows when the faulty batch got submitted it could take actions during the the time it take the media driver to come back from the reset.

Status of TDR in upstream:

	Accepted in upstream	Comments
TDR – Reset Engine	✓ Yes	
TDR – with GuC	X No	
TDR - Watchdog	X No	Requires qualify UI client
IGT – TDR Watchdog	X No	Submitted last week
	Prototype	Comments
TDR - Watchdog	Ubuntu OS w/ drm-tip	iHD Media Stack
IGT – TDR Watchdog	Ubuntu OS w/ drm-tip	Passes validation
IGT – TDR Watchdog	Chrome OS – cros-4.14	Passes validation
TDR - Watchdog	Chrome OS – cros-4.14	i965 Media Stack Support WIP