FastBorderRadius

On the web, and in many UI systems, clips can have rounded corners. In the case of the web, rounded corners are extremely common, as a way of making overflow clipping more visually appealing to users.

Before the launch of FastBorderRadius, Chrome implemented composited rounded corners [1] by drawing a mask into a black/white texture and then "intersecting" the composted layer that we want to round with that texture by using a kDstIn filter. This approach has several downsides, including:

- The need to allocate memory for those textures
- The fact that overflow does **not** cause a stacking context, leading to layer explosion.
- Complicated code in Blink to compute and position the texture correctly
- Overhead throughout the rendering pipeline due to managing all those extra textures
- Extra render surfaces in many cases, leading to even more memory use

In the worst case, sites can see a very severe slowdown due to these problems. One example is this bug.

FastBorderRadius replaces the mask with a GL shader that understands the shape of the curve. This avoids most or all of the above problems.

A finch experiment on the stable channel revealed the following performance wins:

Android 76 stable:
Compositing.Renderer.GPUMemoryForTilingsInKb: -0.62% @ 50th , -2.98% @ 99th
Event.Latency.ScrollUpdate.Touch.TimeToScrollUpdateSwapBegin4: -1.37% @ 99th

Windows 76 stable:
Compositing.Renderer.GPUMemoryForTilingsInKb: -0.62% @ 50th , -3.17% @ 99th
Event.Latency.ScrollUpdate.Wheel.TimeToScrollUpdateSwapBegin4: -0.69% @ 99th

MacOS 77 stable:
Compositing.Renderer.GPUMemoryForTilingsInKb: -2.02% @ 50th , -4.38% @ 99th
Event.Latency.ScrollUpdate.Wheel.TimeToScrollUpdateSwapBegin4: -4.29% @ 99th

[1] A composited rounded corner is one that applies to a composited layer. This combination is actually very common, since scrollers user overflow clipping and those are very often composited for performance reasons. Even before FastBorderRadius, **non**-composited rounded corners already go through a similar code path if GPU raster is turned on (which it is for most users).