

Compute centric vector graphics with `bevy_vello`

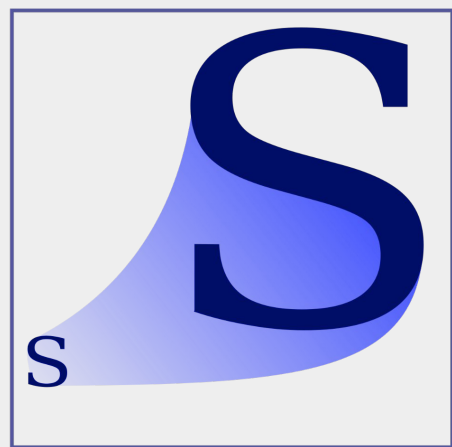
Bevy Game Meetup #5
Spencer C. Imbleau

Necessary context

- Raster graphics:
 - Rows of pixels
 - Favorite child of GPUs
- Vector graphics:
 - Points, lines, equations
 - Smaller footprint
 - Infinitely scalable
 - Image depends on varyings
 - Camera scale, viewbox, etc.



Raster
GIF, JPEG, PNG

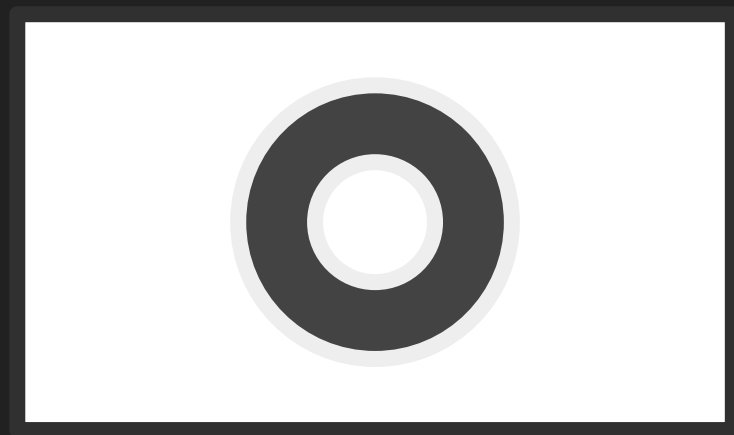


Vector
SVG

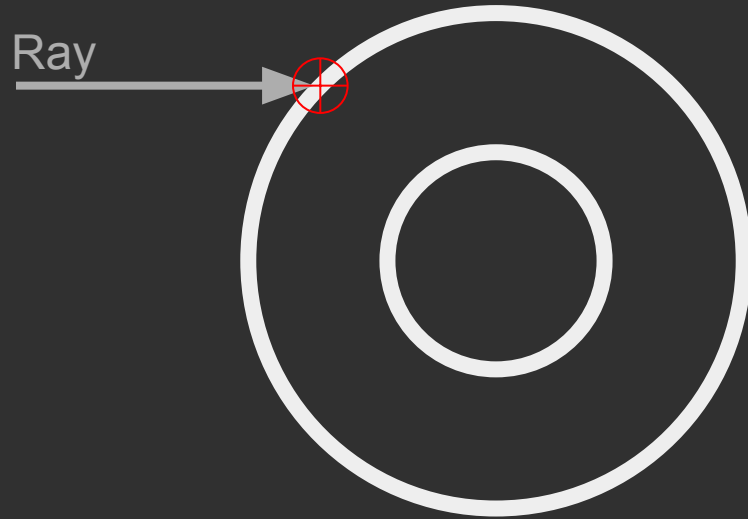
Naive rendering of vector graphics



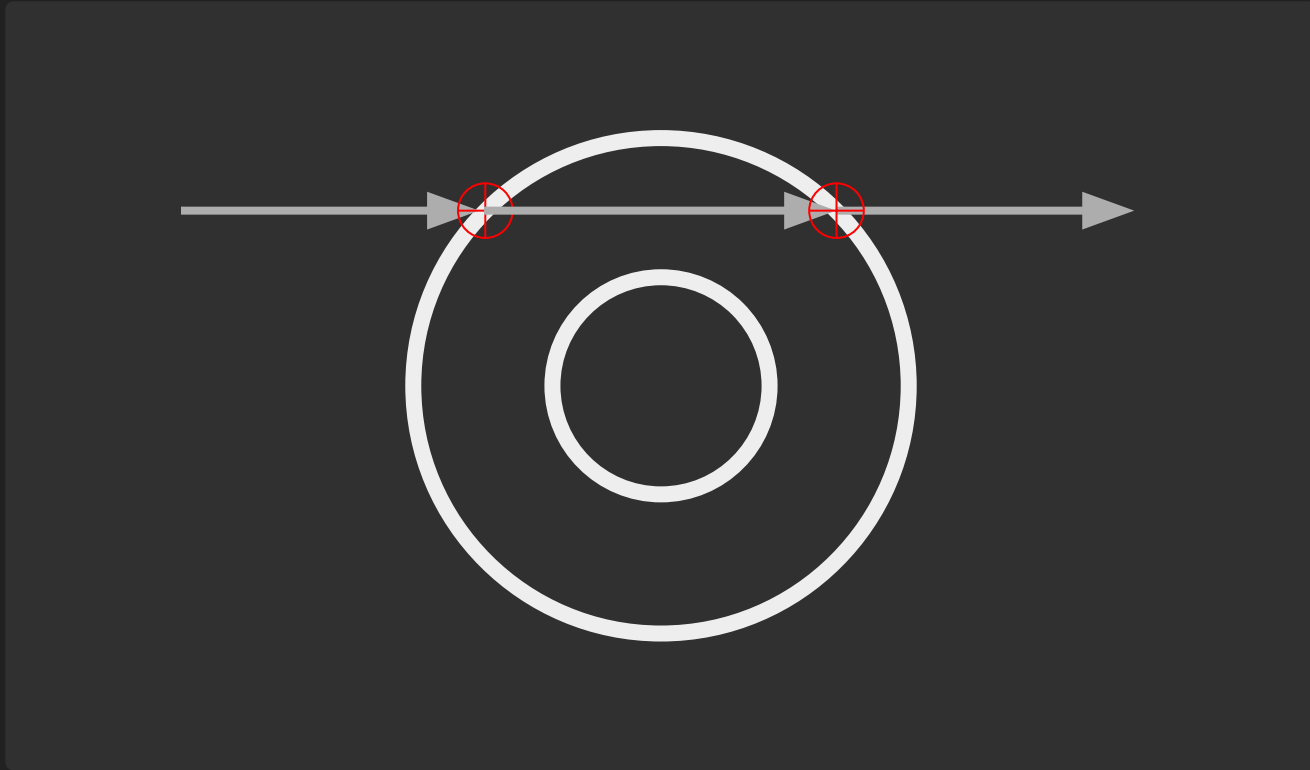
Naive rendering of vector graphics



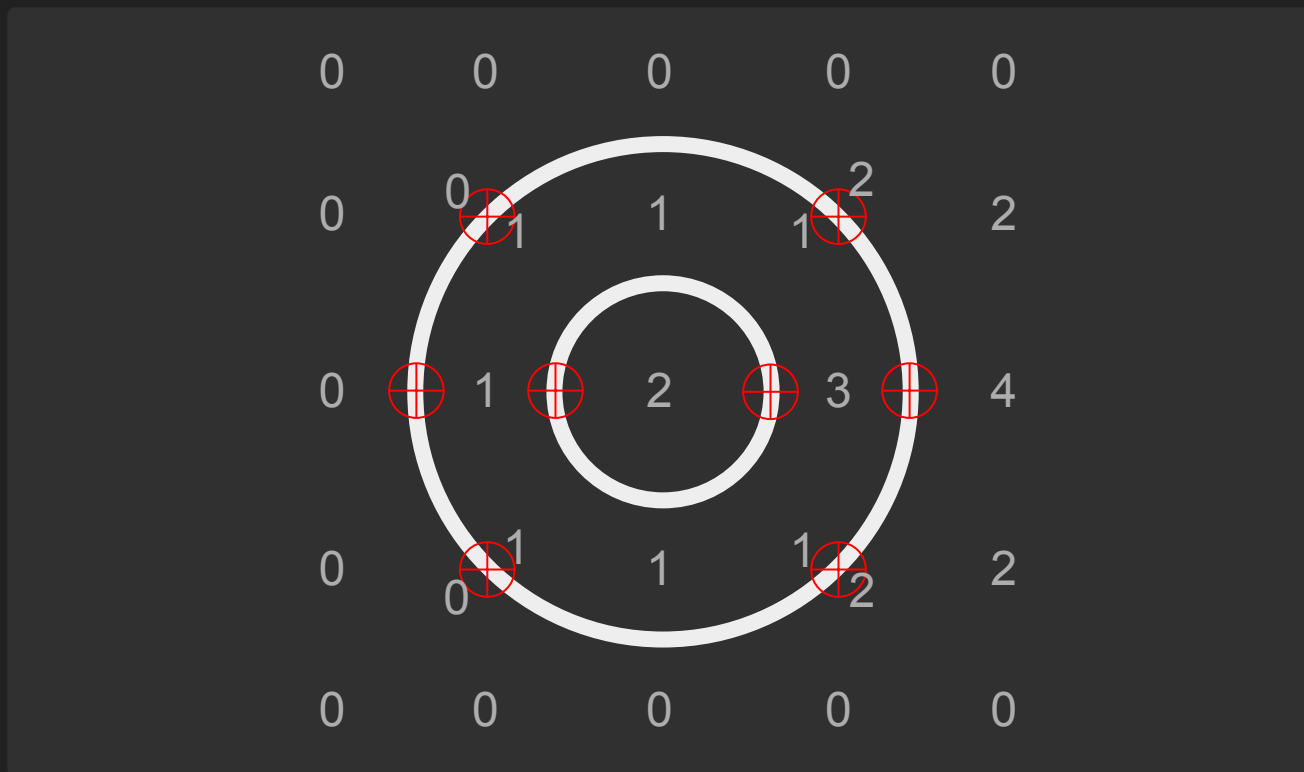
Naive rendering of vector graphics



Naive rendering of vector graphics

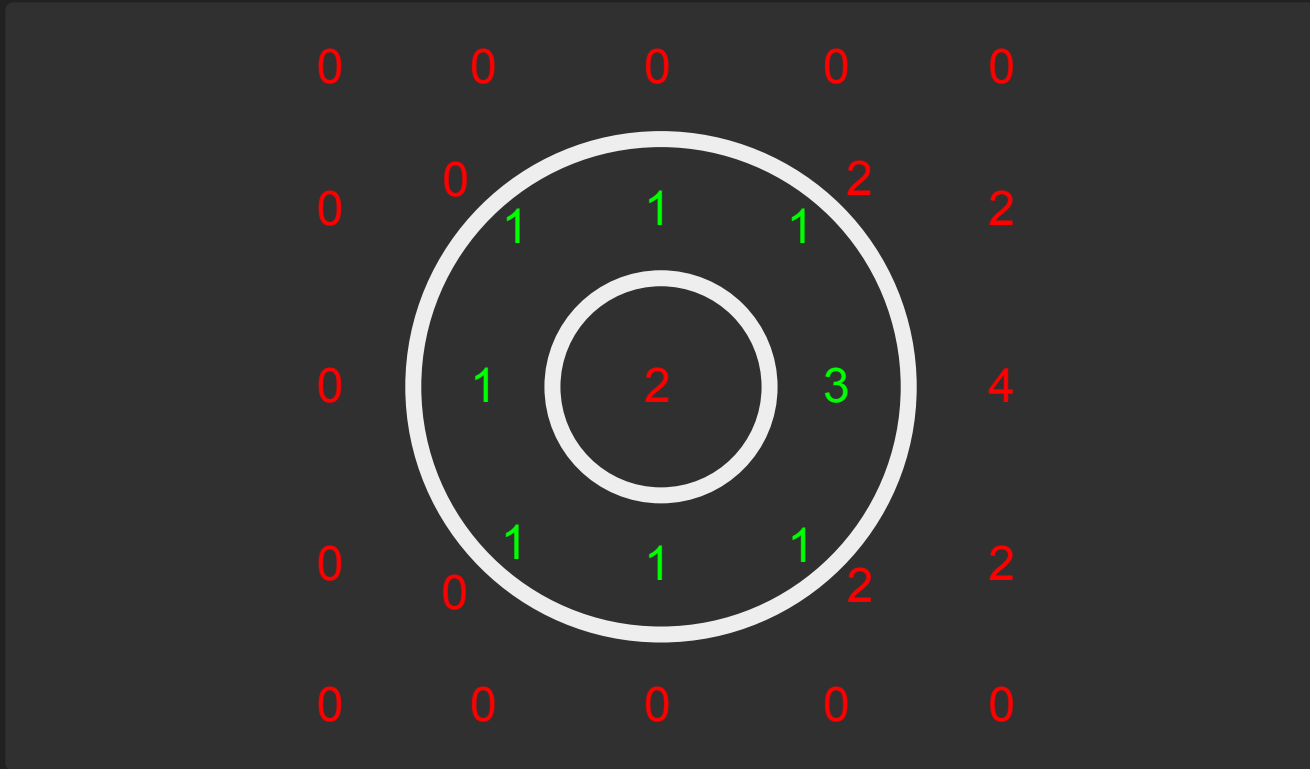


Naive rendering of vector graphics



Naive rendering of vector graphics

Odd
Even

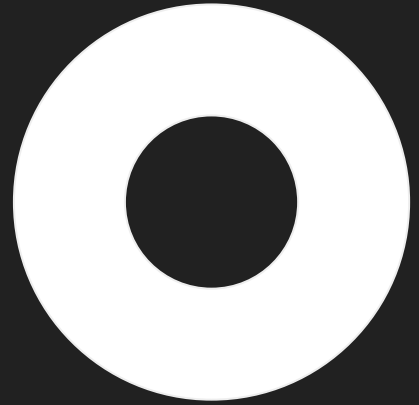


Naive rendering of vector graphics



Scaling up the problem

- We have 100 shapes on the screen
- Can that be done on the GPU? Not easily.
 - Vector graphics suffer from a *locality issue*.
You must know all the shapes in the image
 - GPU pipeline is rigid
Vertex shader...
Geometry shader...
Rasterization...
Fragment shader...

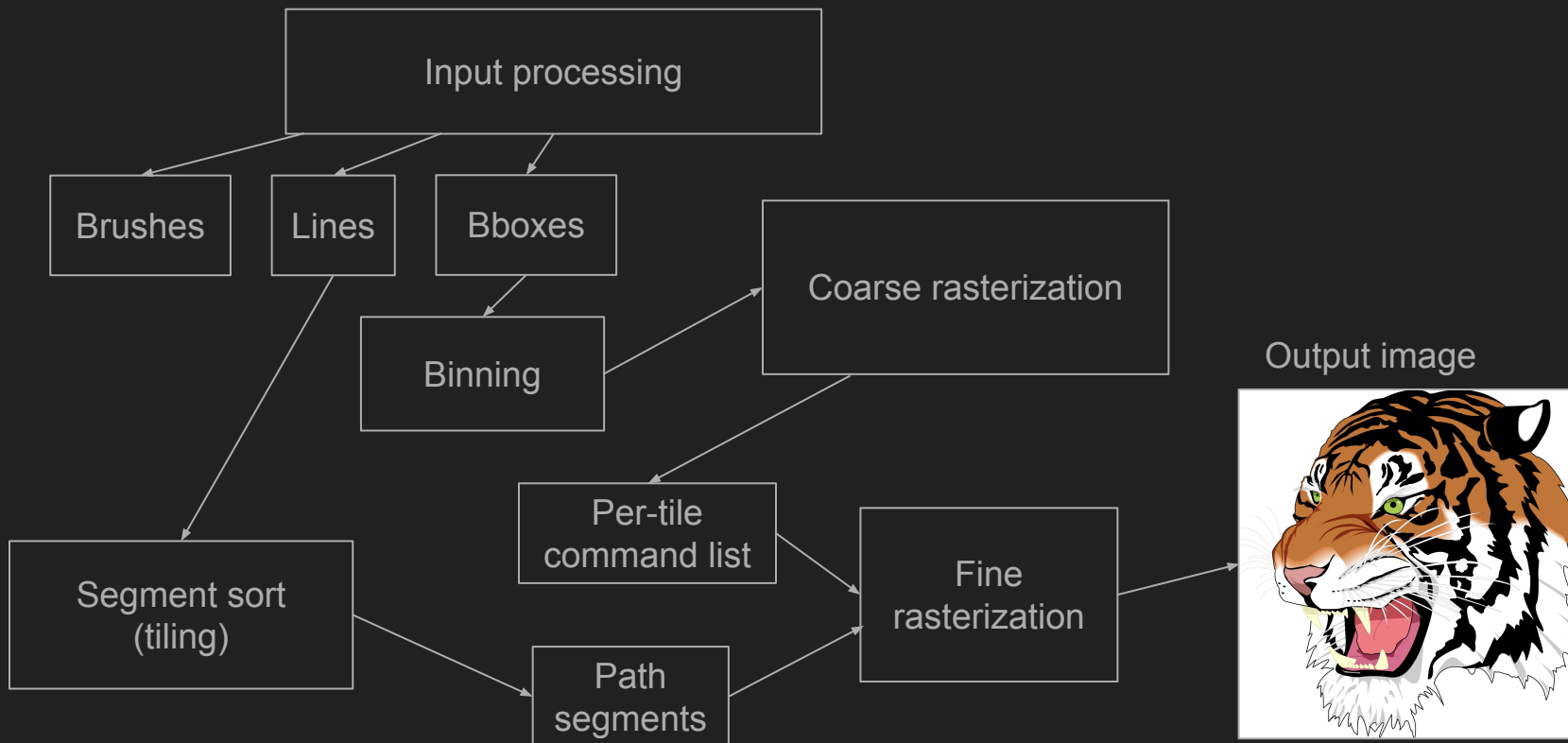


Vello

- “*Compute-centric*” vector graphic renderer
- Compute shaders can directly process vector graphics
- Written on top of WebGPU
- Feature rich and “svg-like” API for drawing
 - fills, strokes, gradients, text, images, clips, blends
- Suitable for highly dynamic scenes
 - does not rely on precomputation
 - no performance landmines

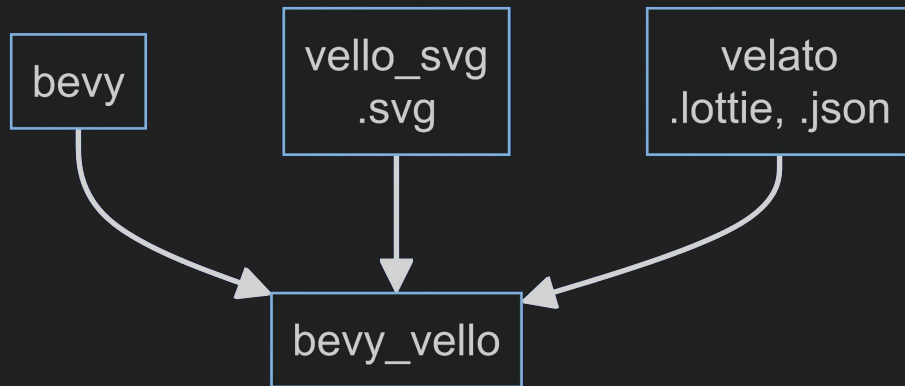
Vello (is complicated)

Slide attribution:
Raph Levien



bevy_vello

- Enables support for new bevy assets
- Support for:
 - Vello Scenes
 - Vello Text (through parley)
 - SVG images
 - Lottie animations
- In progress:
 - dotLottie animations
 - LottieLab interactive lottie



Use cases

- Video games
- UI
- Font editor
- Commercial applications

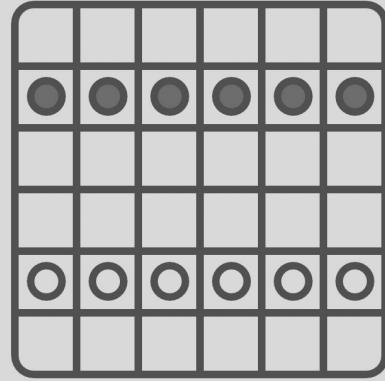


Image attribution:
Carter Anderson @cart_cart

Demos

In use

- [voxell-tech/bevy_motiongfx](#) ★150+
- [simbleau/vong](#) ★60+
- [cpetzold/splined](#)
- [loopystudios/wootnewts](#)

Web Demos

- vello demo
 - <https://linebender.org/vello/>
- bevy_vello demo
 - https://linebender.org/bevy_vello/
- velato demo
 - <https://linebender.org/velato/>
- vello_svg demo
 - https://linebender.org/vello_svg/
- vong
 - <https://simbleau.github.io/vong/>
 - <https://www.youtube.com/watch?v=hNu5oF18j5g>

Usage

Plenty of examples:

https://github.com/linebender/bevy_vello/tree/main/examples

Questions?

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