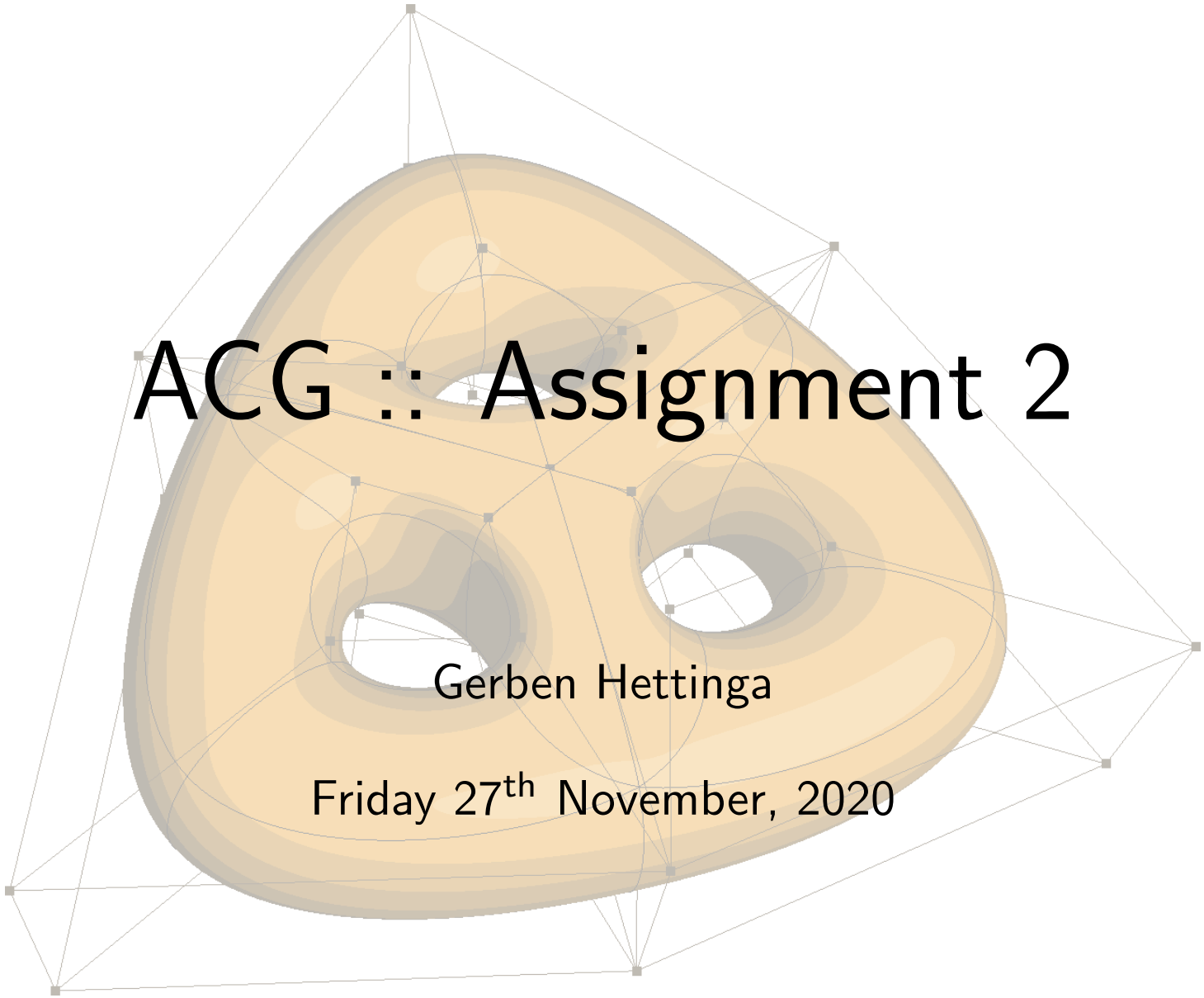

ACG :: Assignment 2

Gerben Hettinga

Friday 27th November, 2020

Previous lecture

- Questions, discussion, ...

Assignment

MA Add boundary rules for Loop subdivision

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MA Implement reflection lines or isophotes

- Example

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AF Vertex selection

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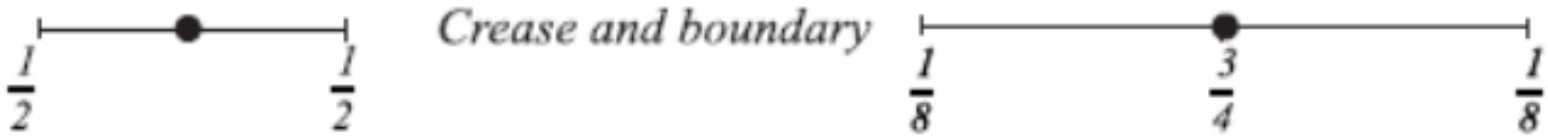
AF Vertex selection

B Gaussian curvature or edge selection

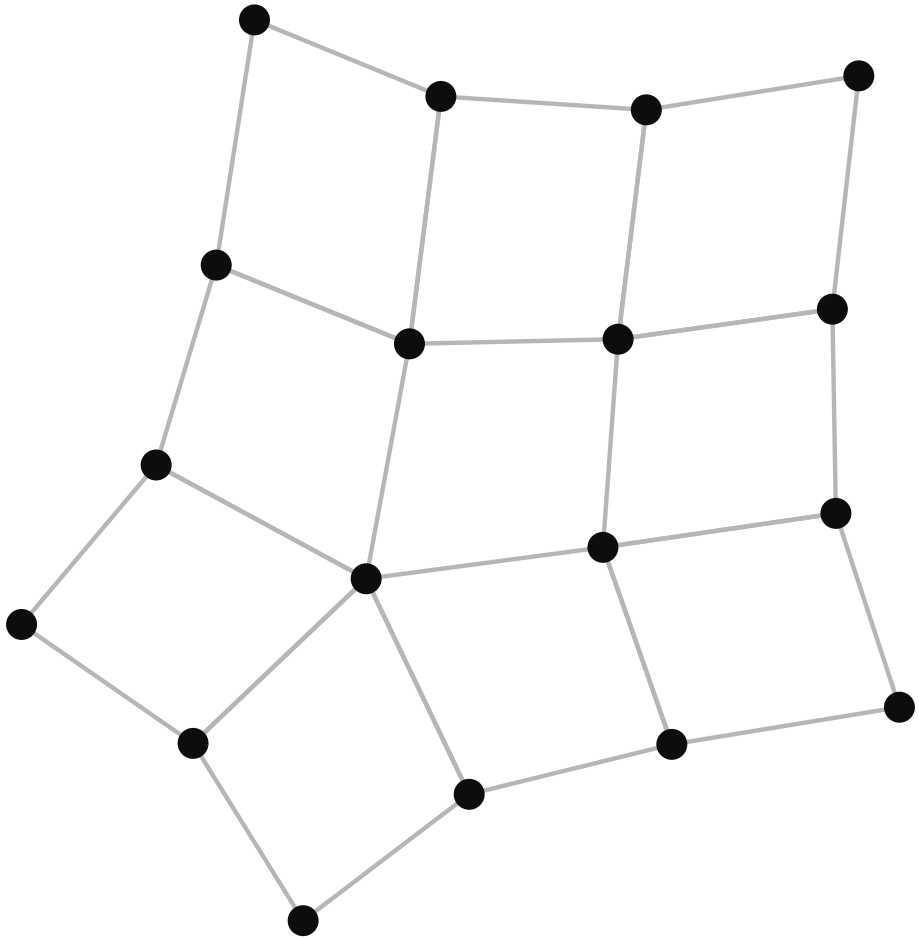
Boundary Rules



a. *Masks for odd vertices* b. *Masks for even vertices*

- The half-edge data structure is not correctly set up for meshes with a boundary!
- These are the curve rules from the last lab session

Half-Edge data structure



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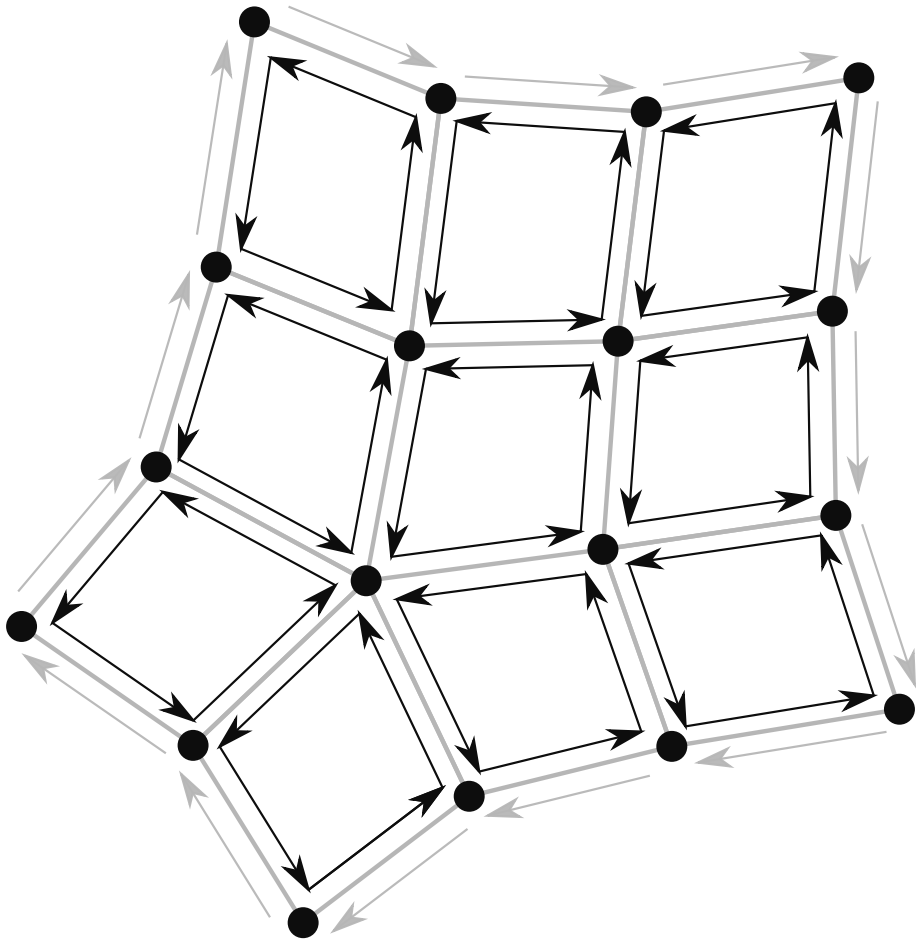
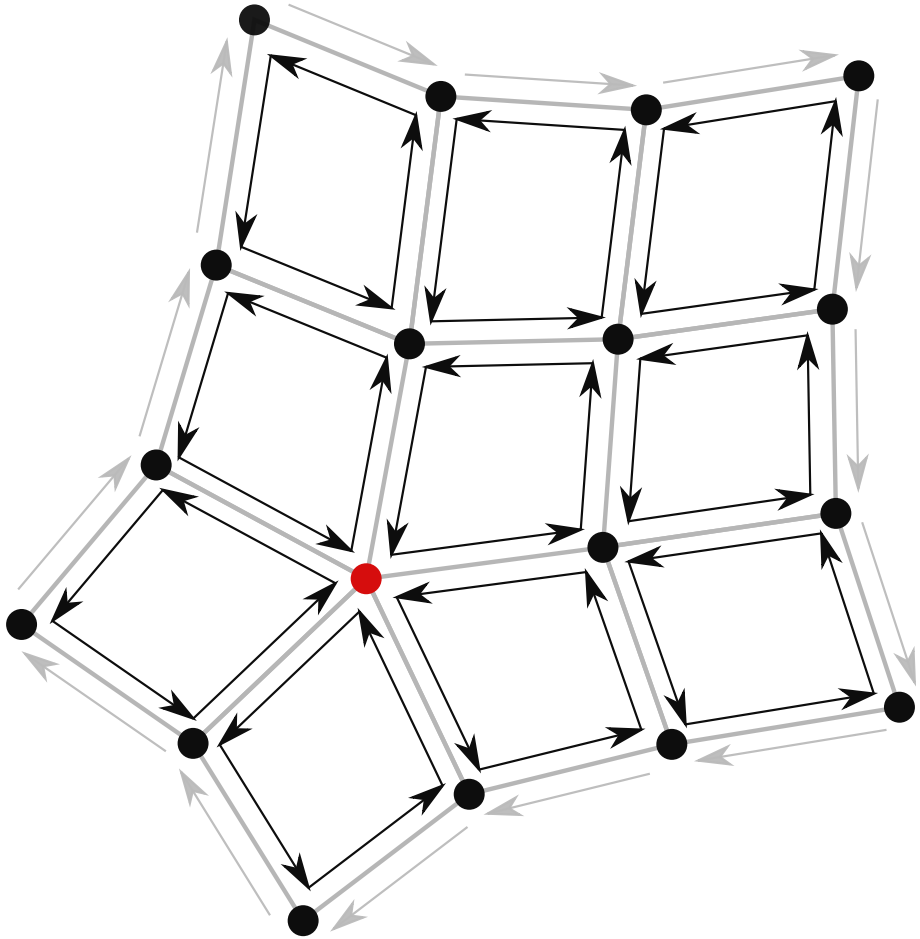


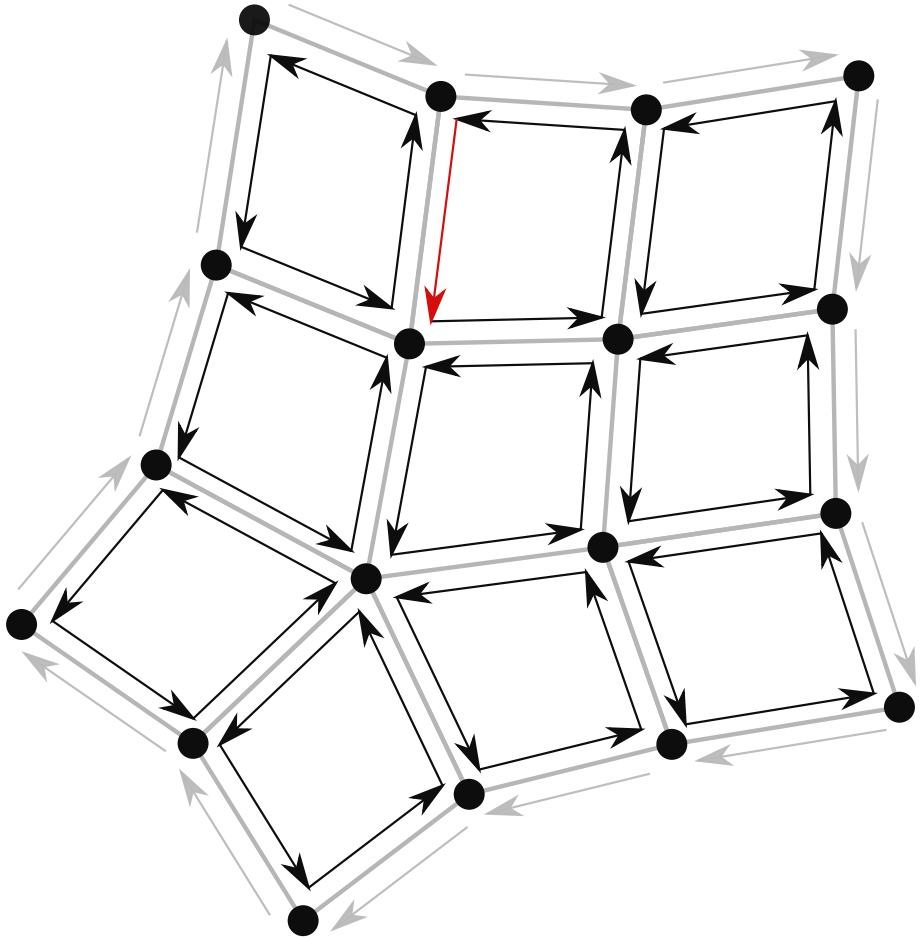
Half-Edge data structure

- Vertices



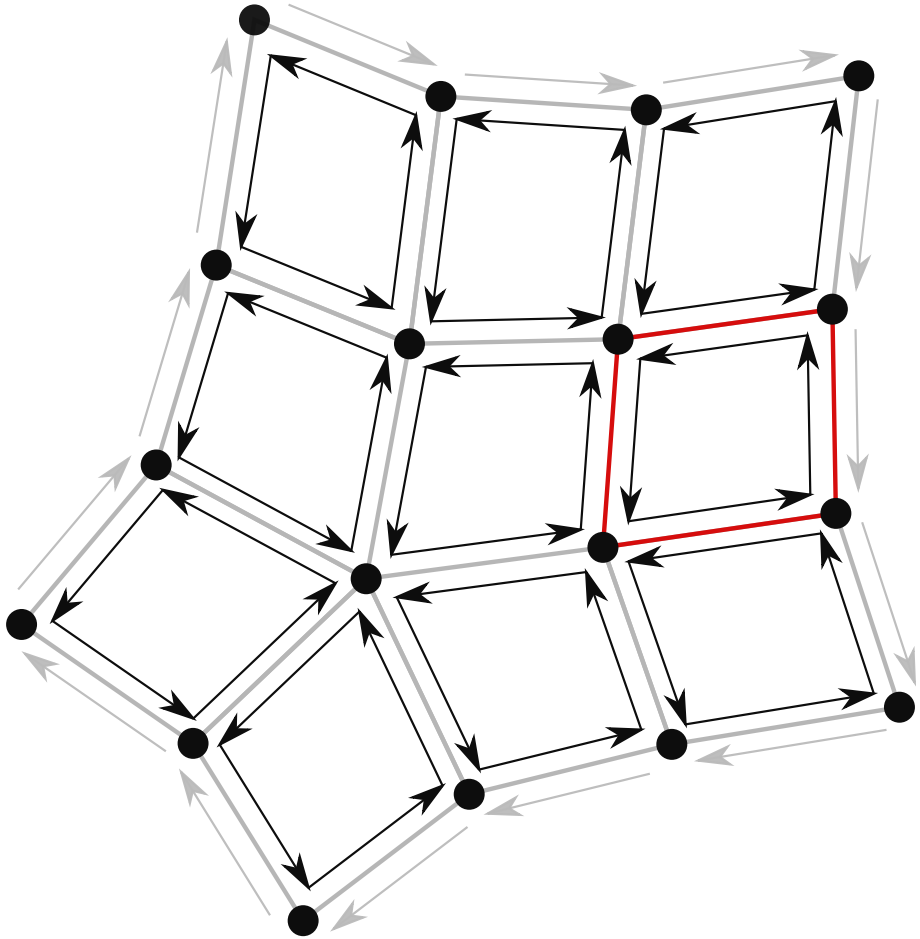
Half-Edge data structure

- Vertices
- HalfEdges



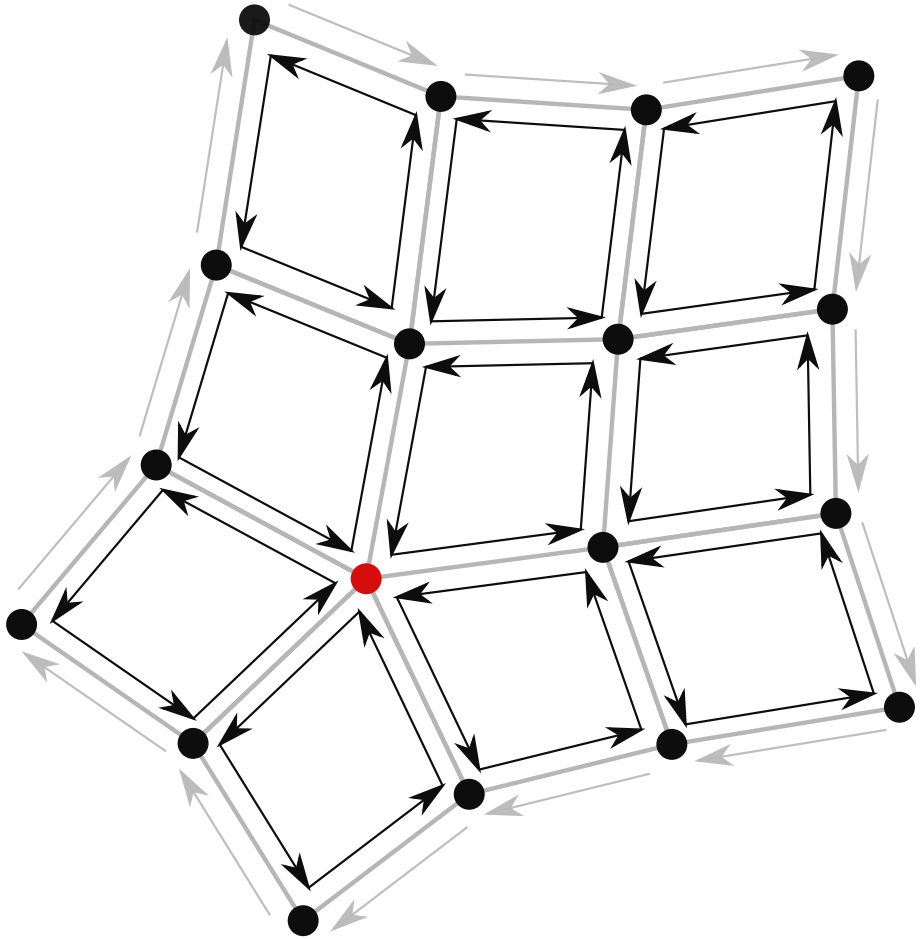
Half-Edge data structure

- Vertices
- HalfEdges
- Faces



Half-Edge data structure :: Vertex

- x, y and z
- Out (HalfEdge*)
- Valency



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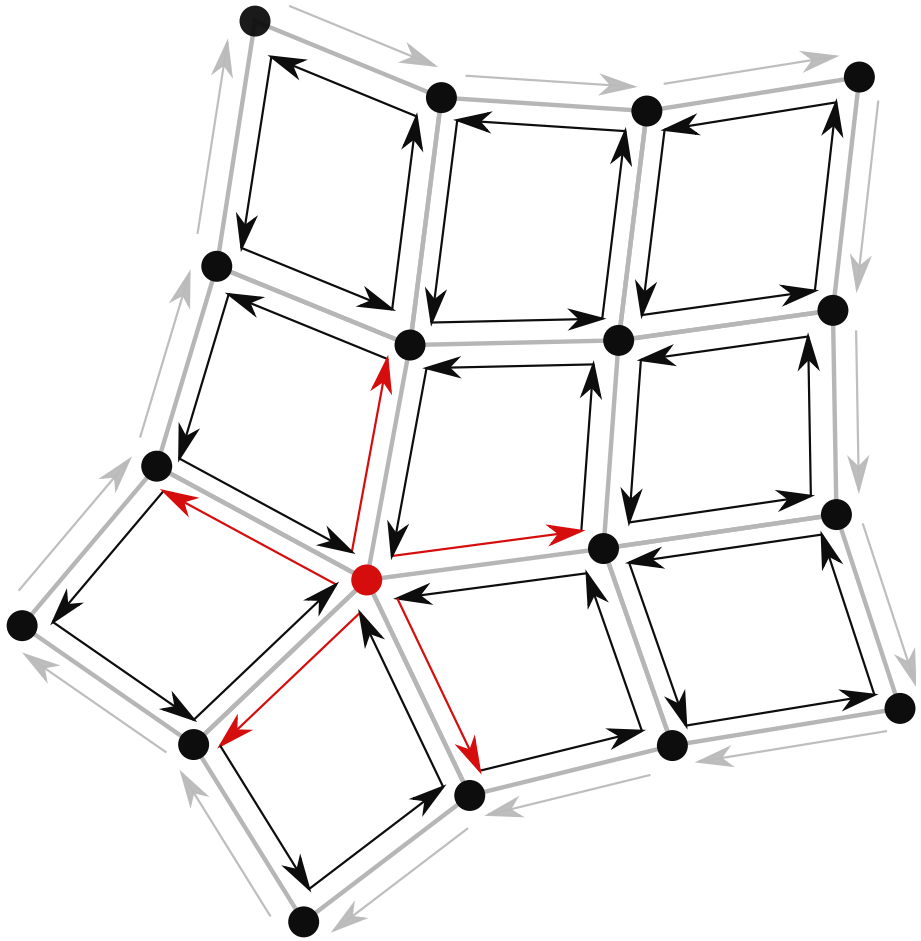

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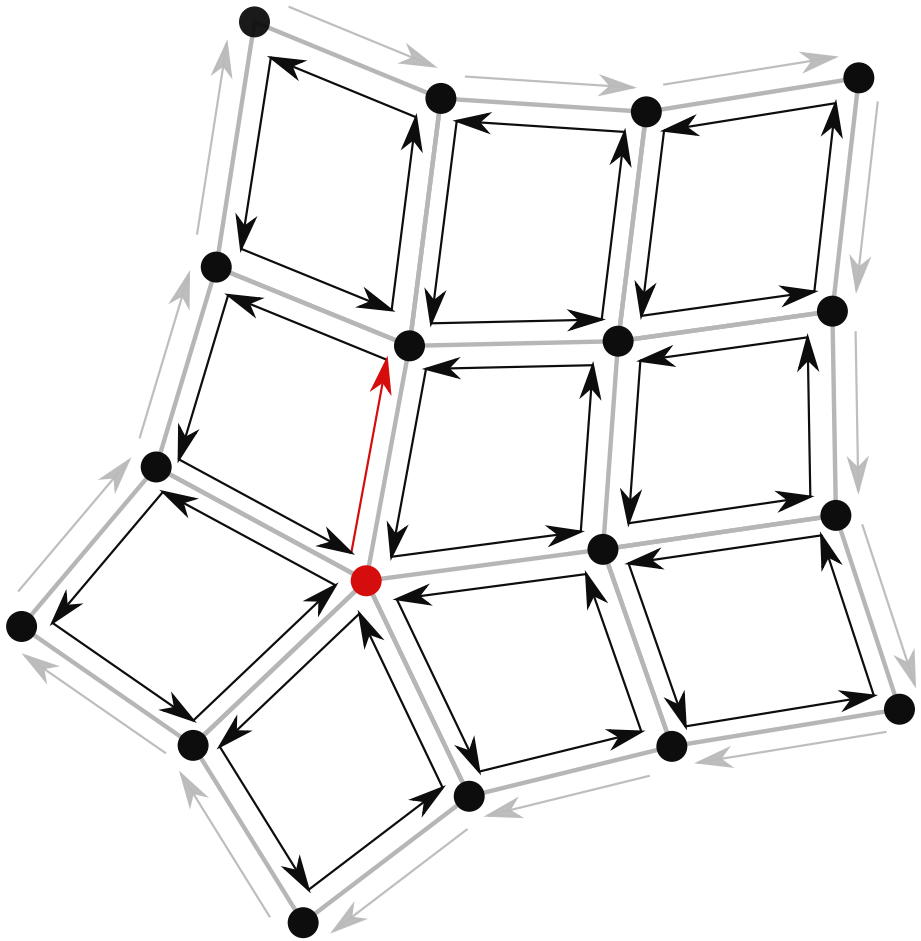

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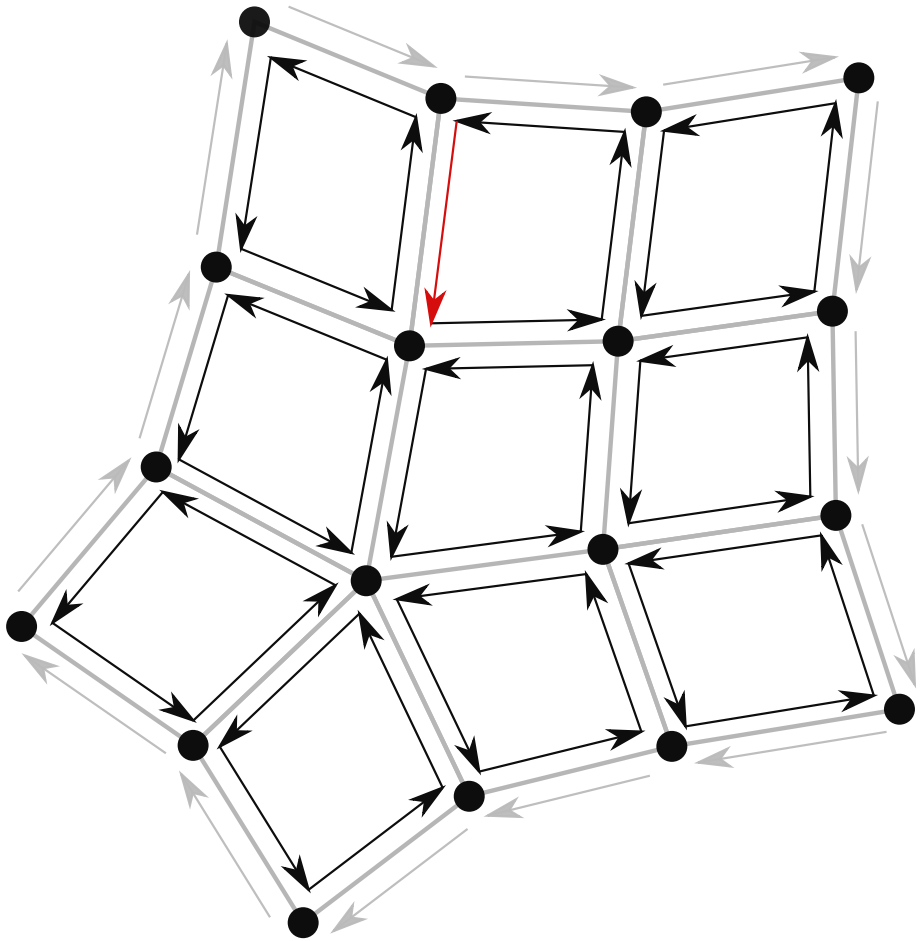

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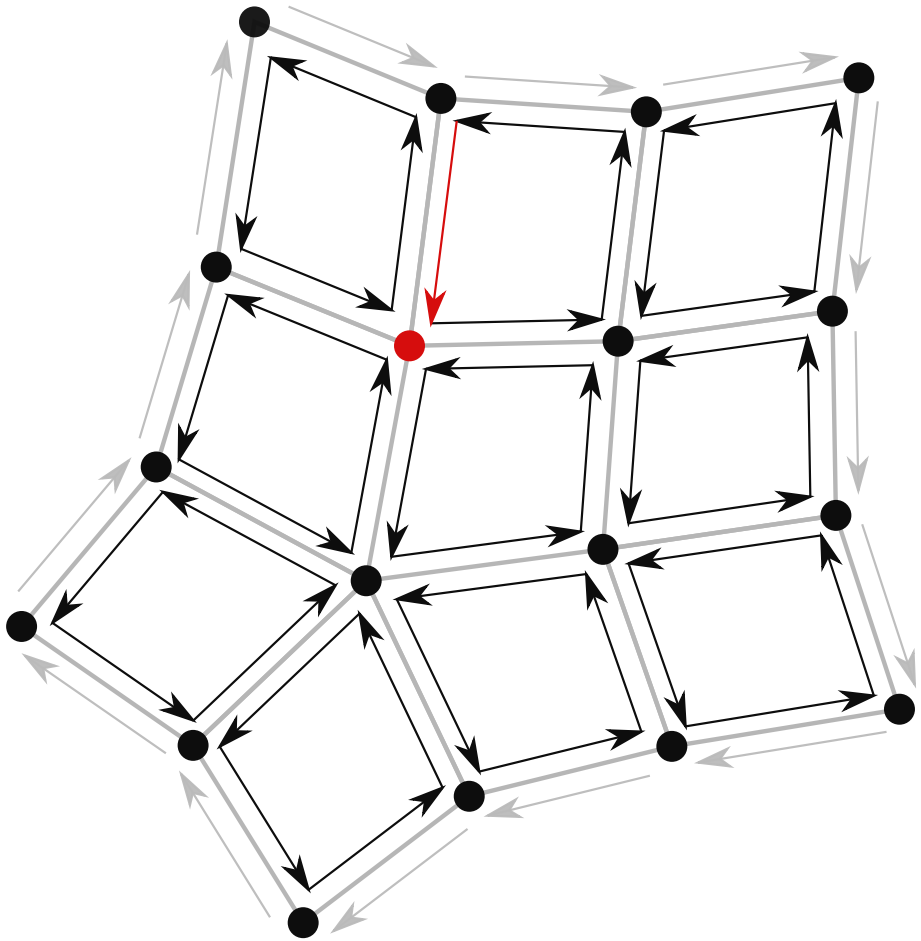

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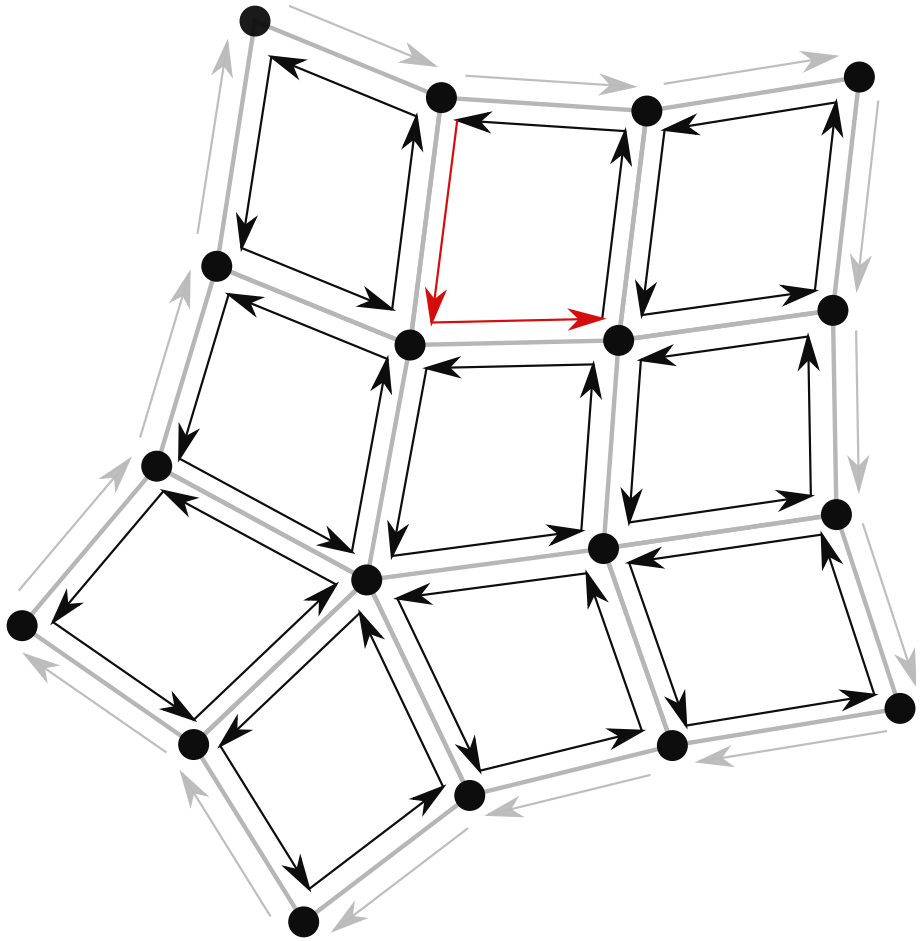

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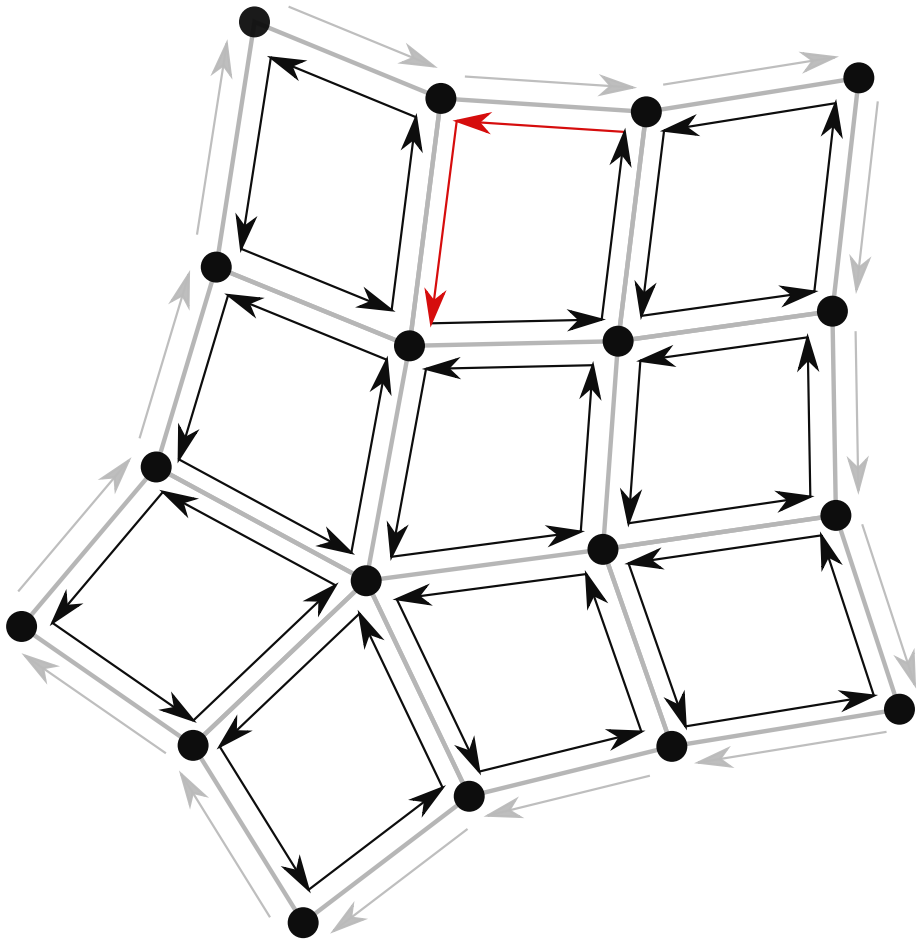

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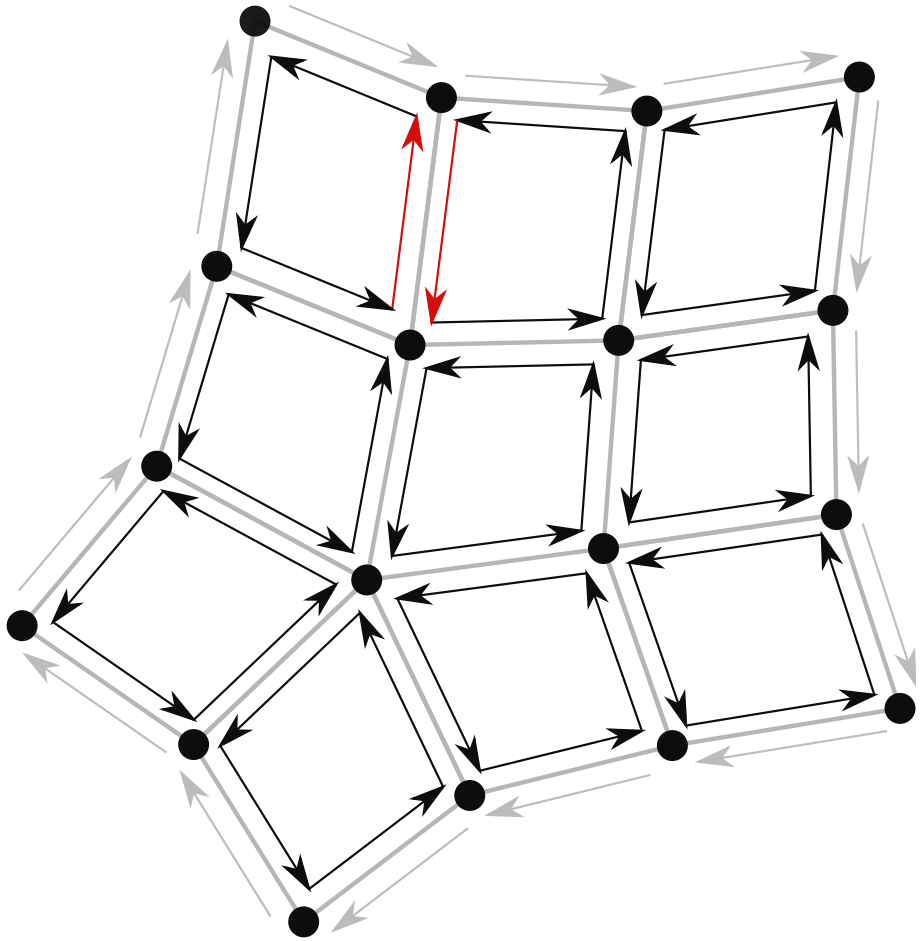

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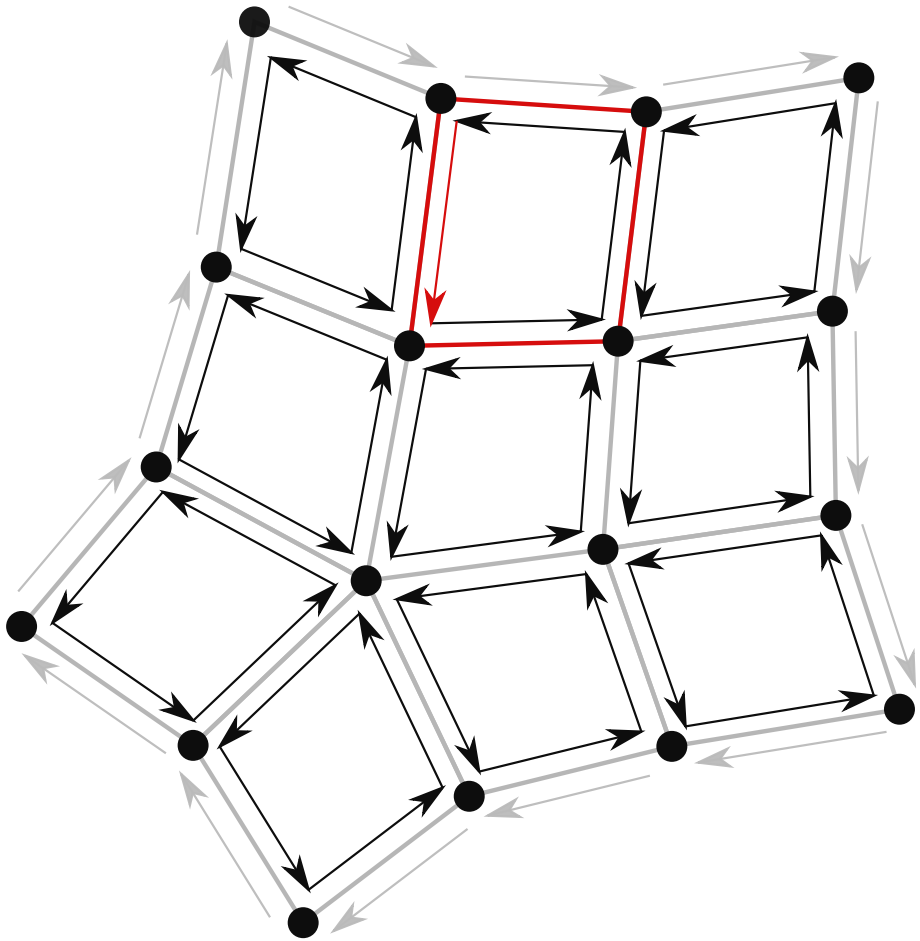
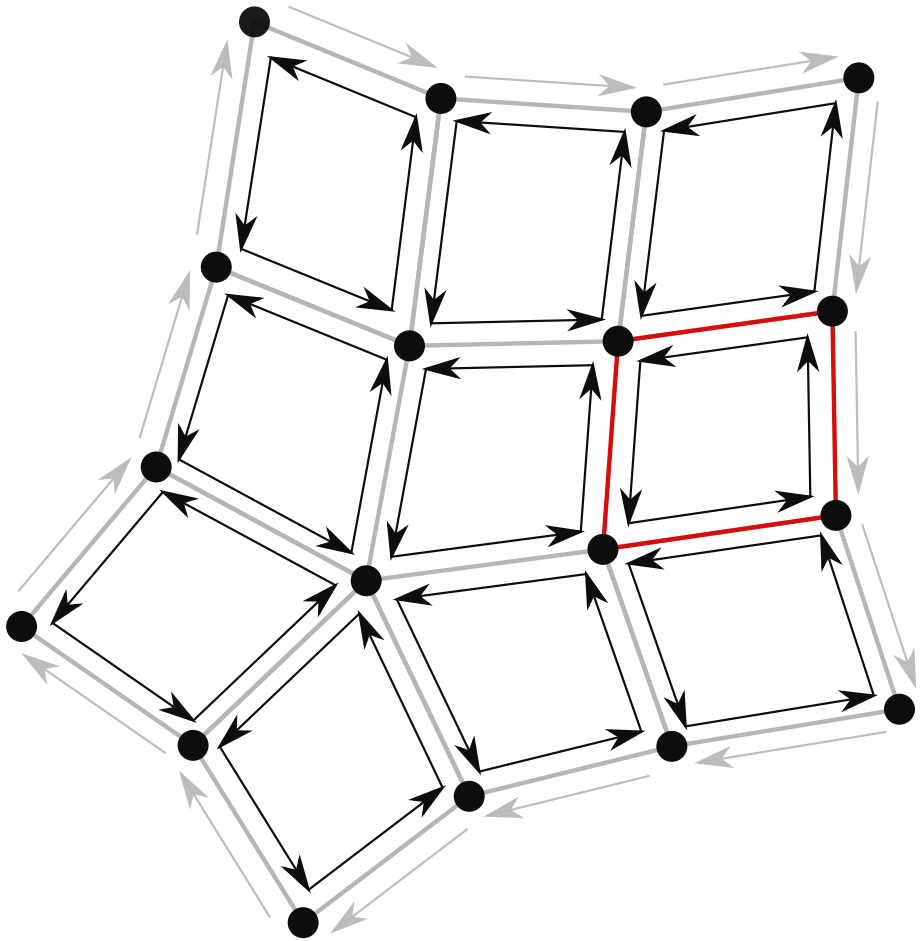


Half-Edge data structure :: Face

- Side (HalfEdge*)
- Valency



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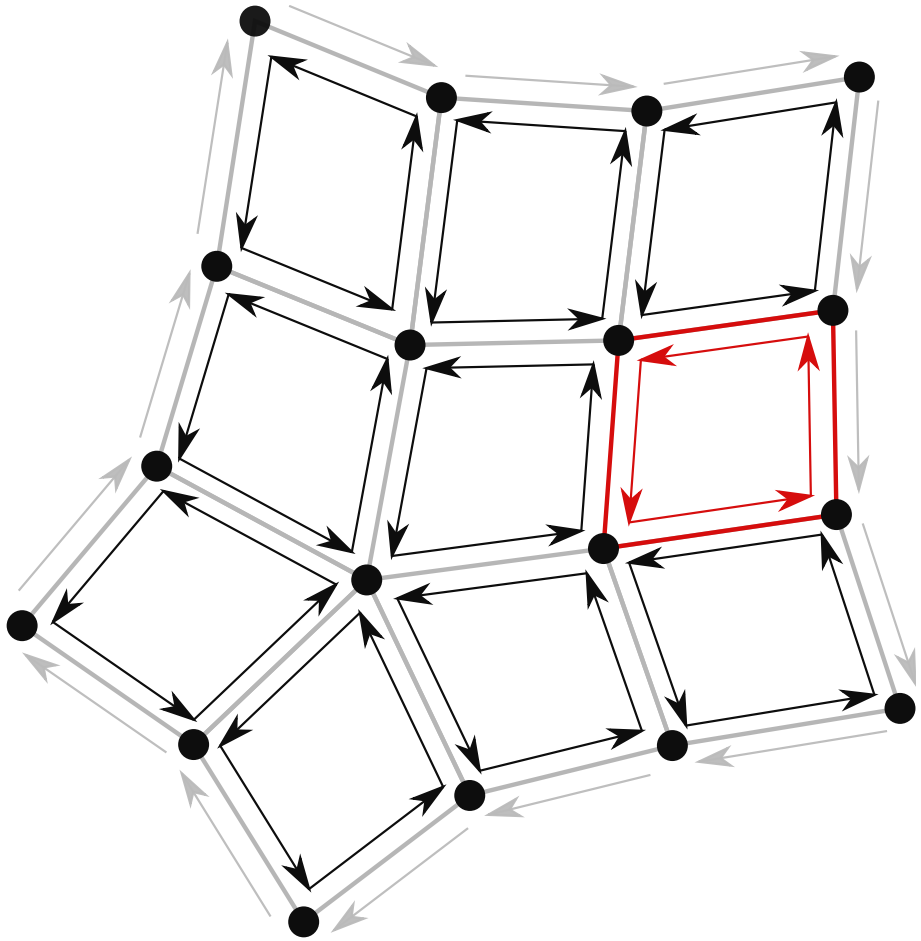

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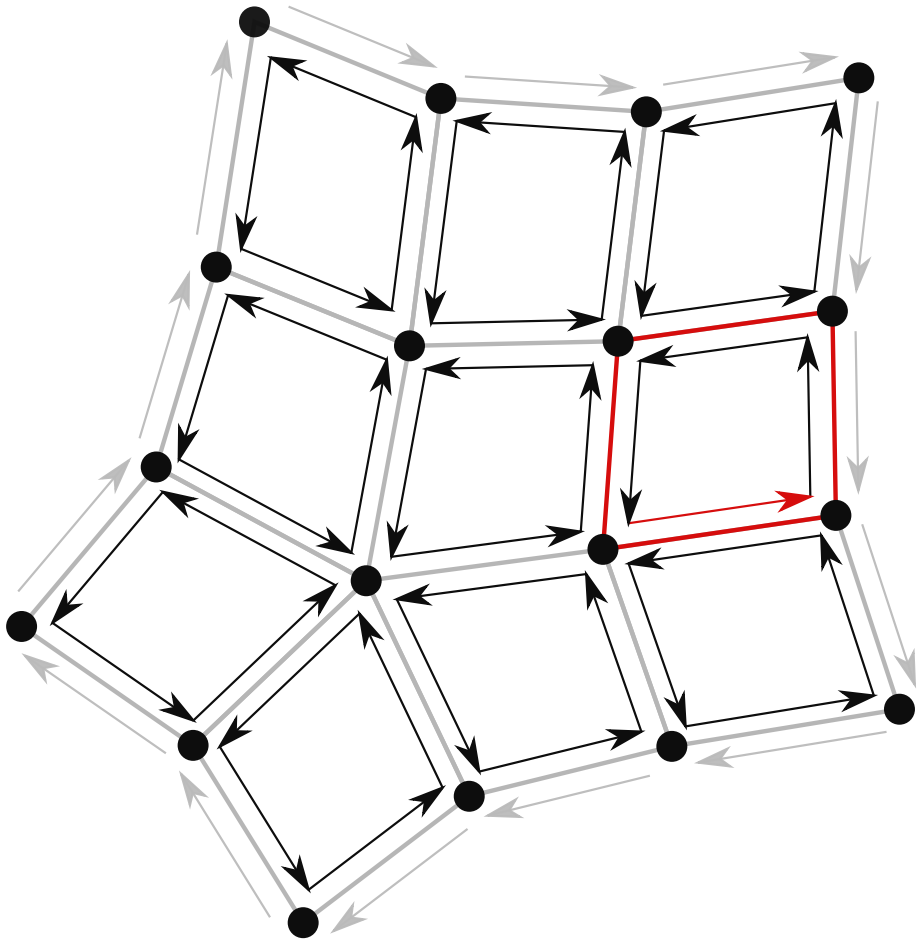

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- Don't try to think about the structure, but draw it out!
- Iteration around vertex: `HalfEdge* he = out;`
  - `he = twin->next;`
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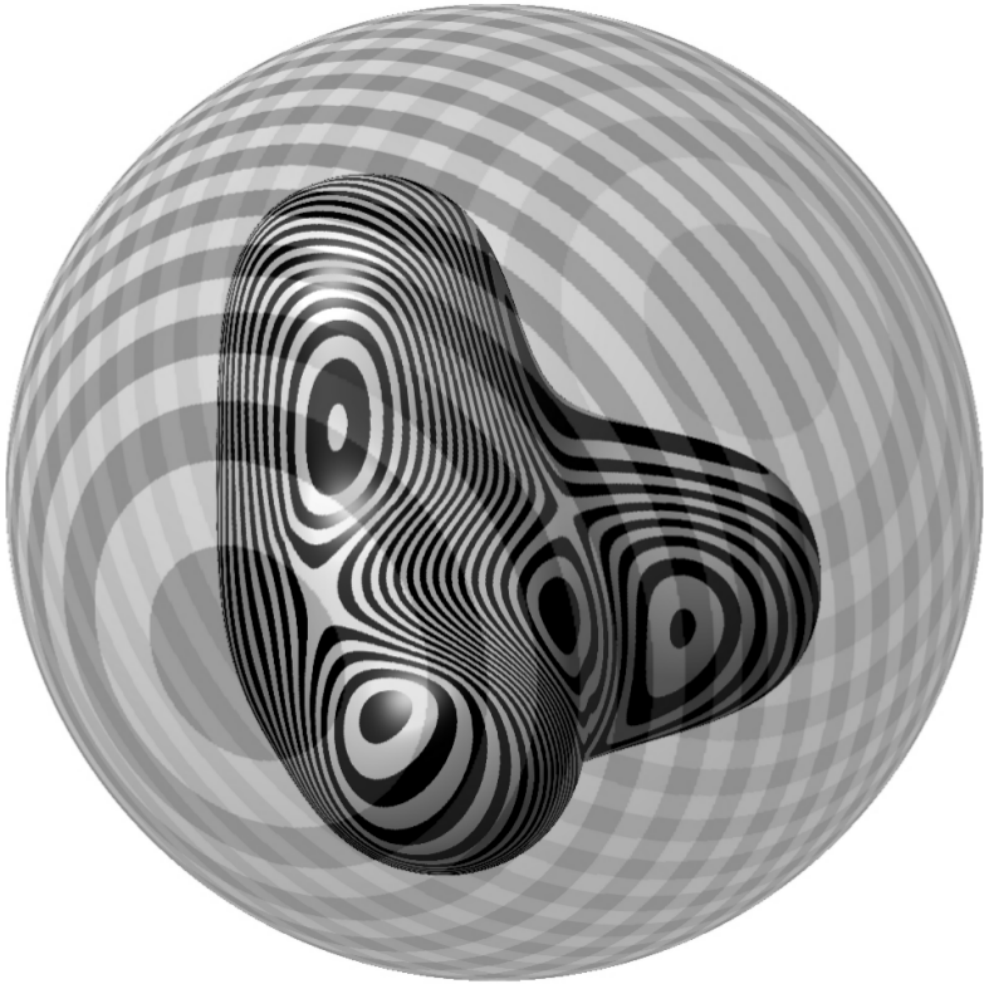
- Iteration around face: `HalfEdge* he = side;`
  - `he = he->next;`
  - `he = he->prev;`

Reflection lines (interpretation)



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- Window/Screen $\rightarrow$ NDC $\rightarrow$ Clipping
  - Invert the viewport transformation and multiply by the right value for w. This is not trivial!
- Clipping $\rightarrow$ Camera/Eye $\rightarrow$ World ($\rightarrow$ Object)
  - Simply invert the Projection and ModelView matrices

Miscellaneous OpenGL/GLSL

- Reminder: GLSL provides built-in functions such as clamp(), length(), dot(), cross() and many more. See https://www.opengl.org/sdk/docs/man/ (look for GLSL Functions in the left panel).

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- Custom GLSL syntax highlighting, see e.g. http://renderingpipeline.com/2013/12/glsl-syntax-highlighting-for-opengl-4-4/