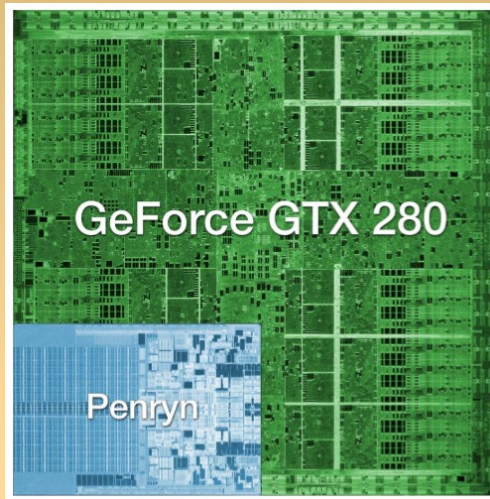


Shadow Mapping



Outline

- Quick introduction to computer graphics.
- Why Shadows ?
- The shadow mapping algorithm.
- Strengths and weaknesses

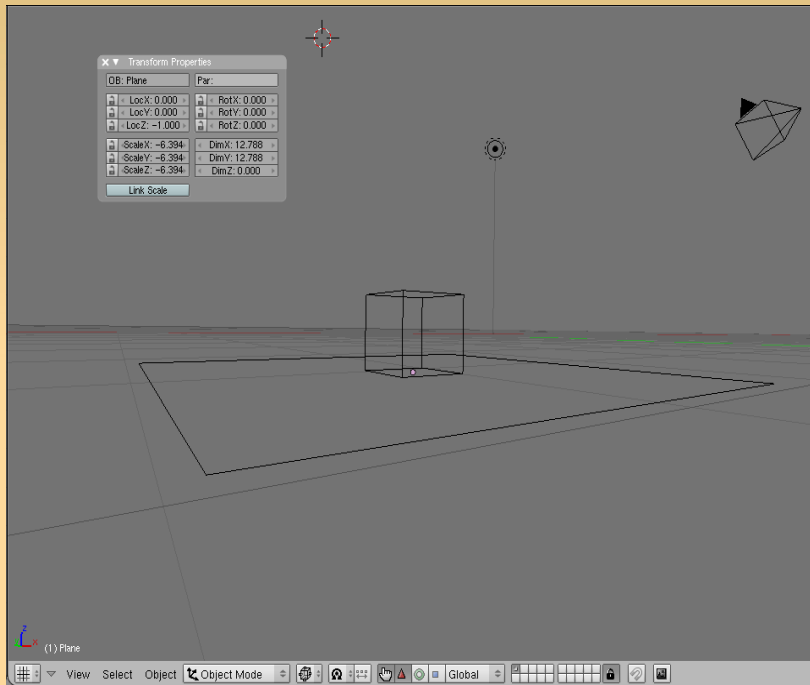
You will ...

- Get an abstract view of how Computer Graphics works.
- Be able to outline the the shadow mapping algorithm.
- Know that this technique is used in current games.
- Be able to list some weaknesses and strengths of shadow mapping.

Computer graphics

- A set of data: triangles in 3D space.
 - Provided by an artist.
- Methods of “rendering” (Drawing) these triangles on a computer screen.
 - Developed by a programmer.

Computer Graphics: the artist

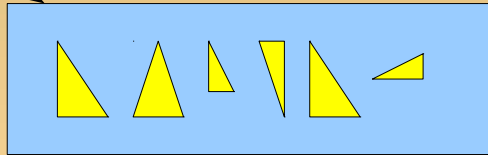


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Computer Graphics: the programmer

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```

Read data

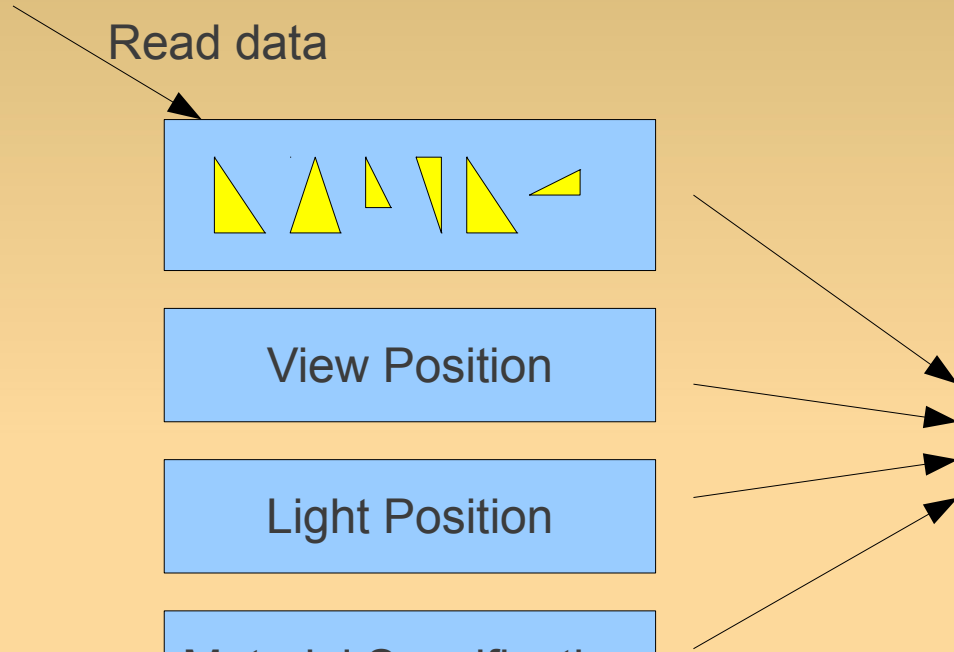


View Position

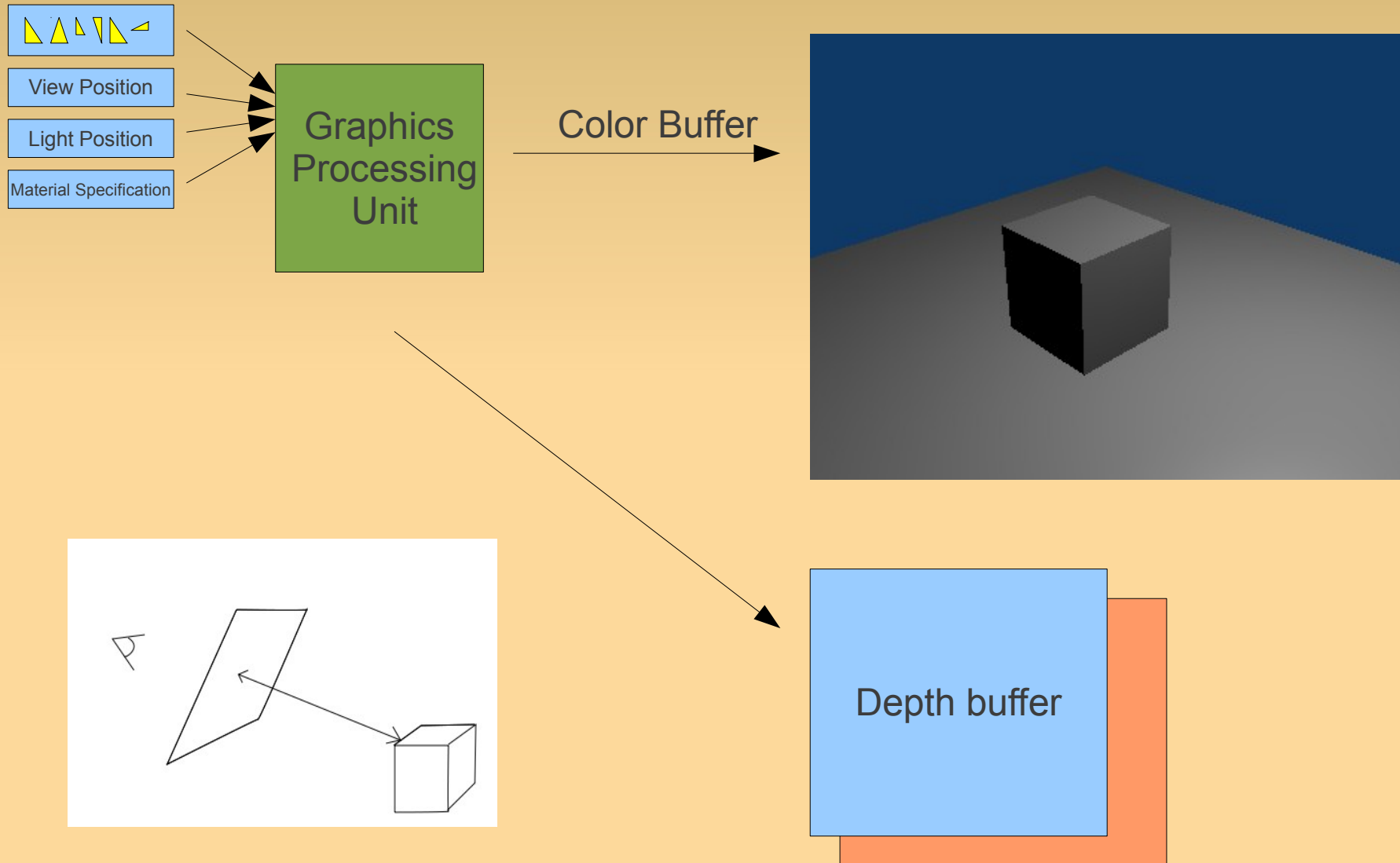
Light Position

Material Specification

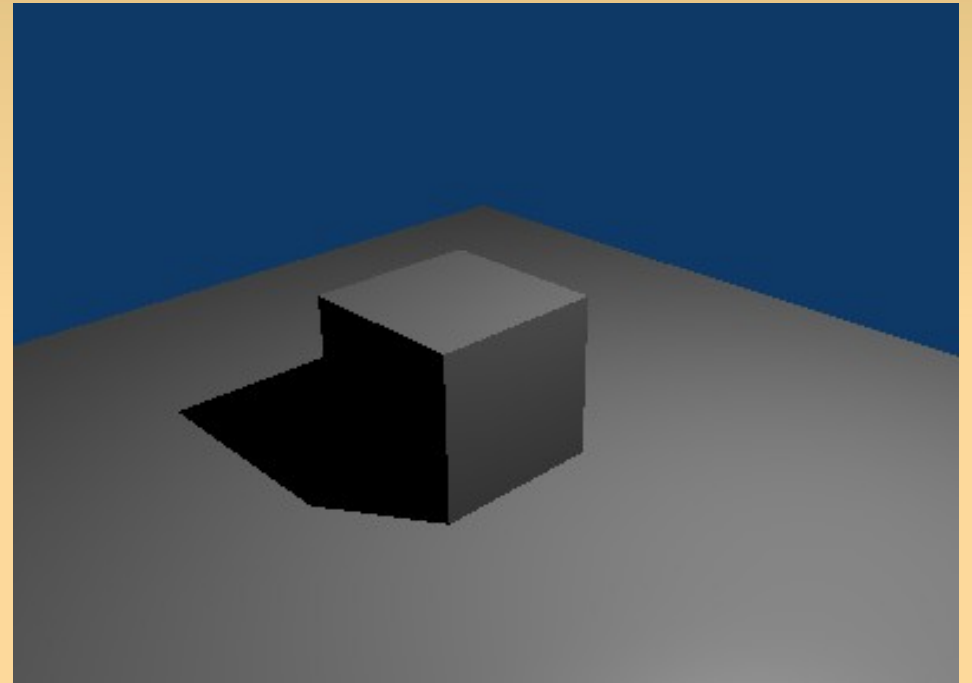
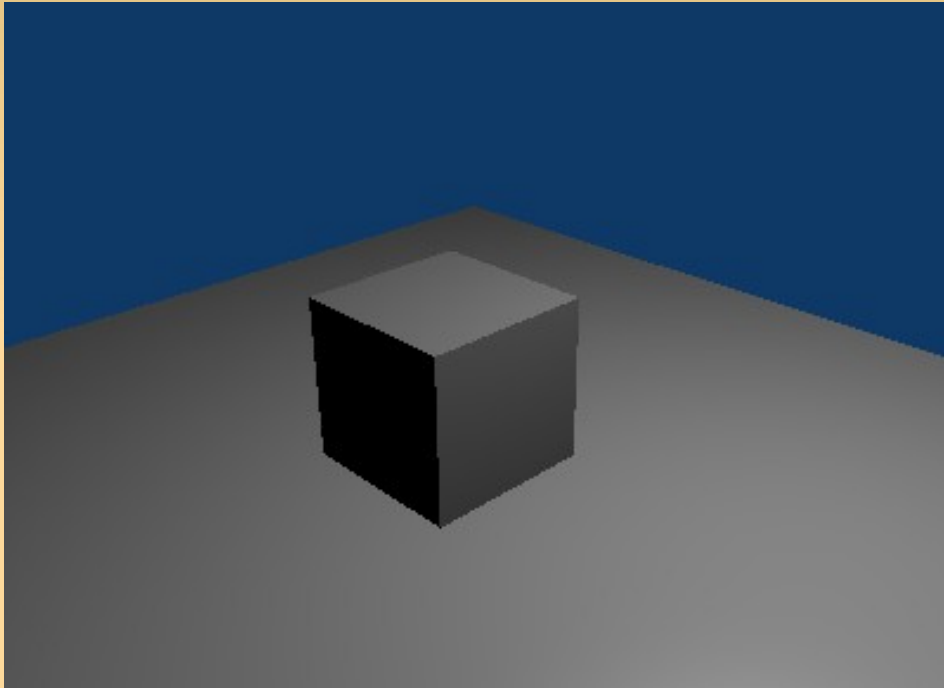
Graphics Processing Unit



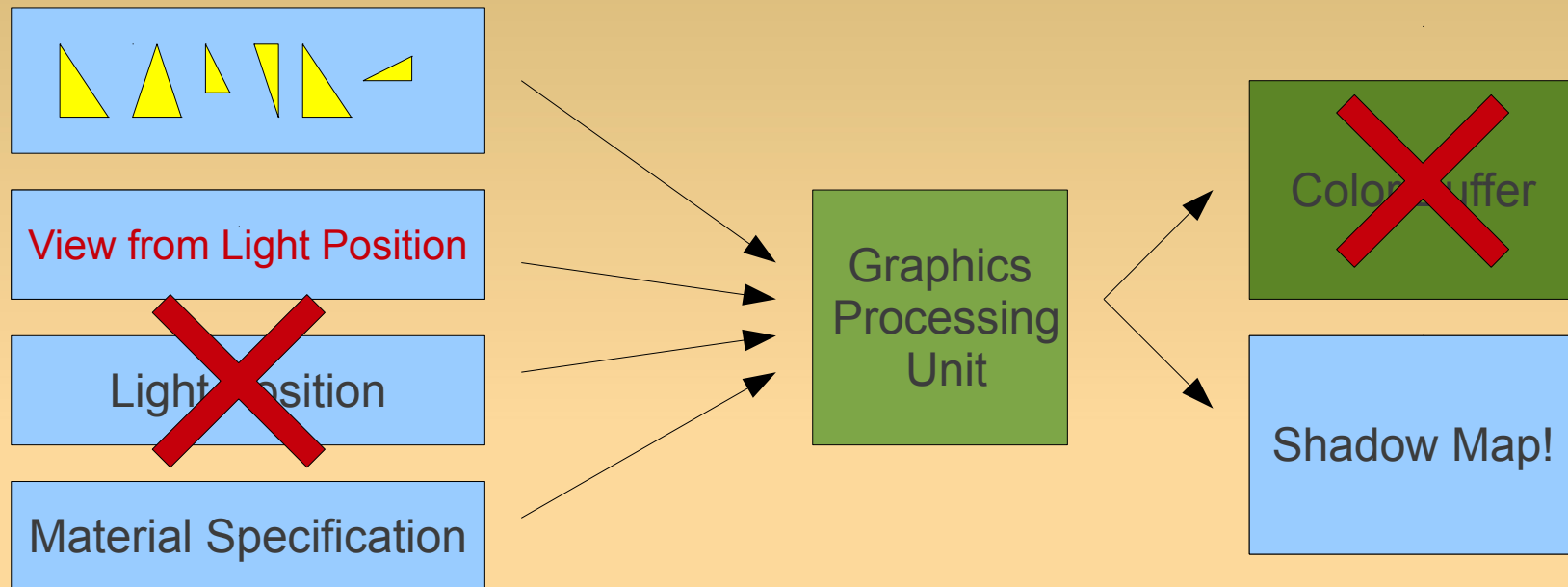
Computer Graphics: The GPU



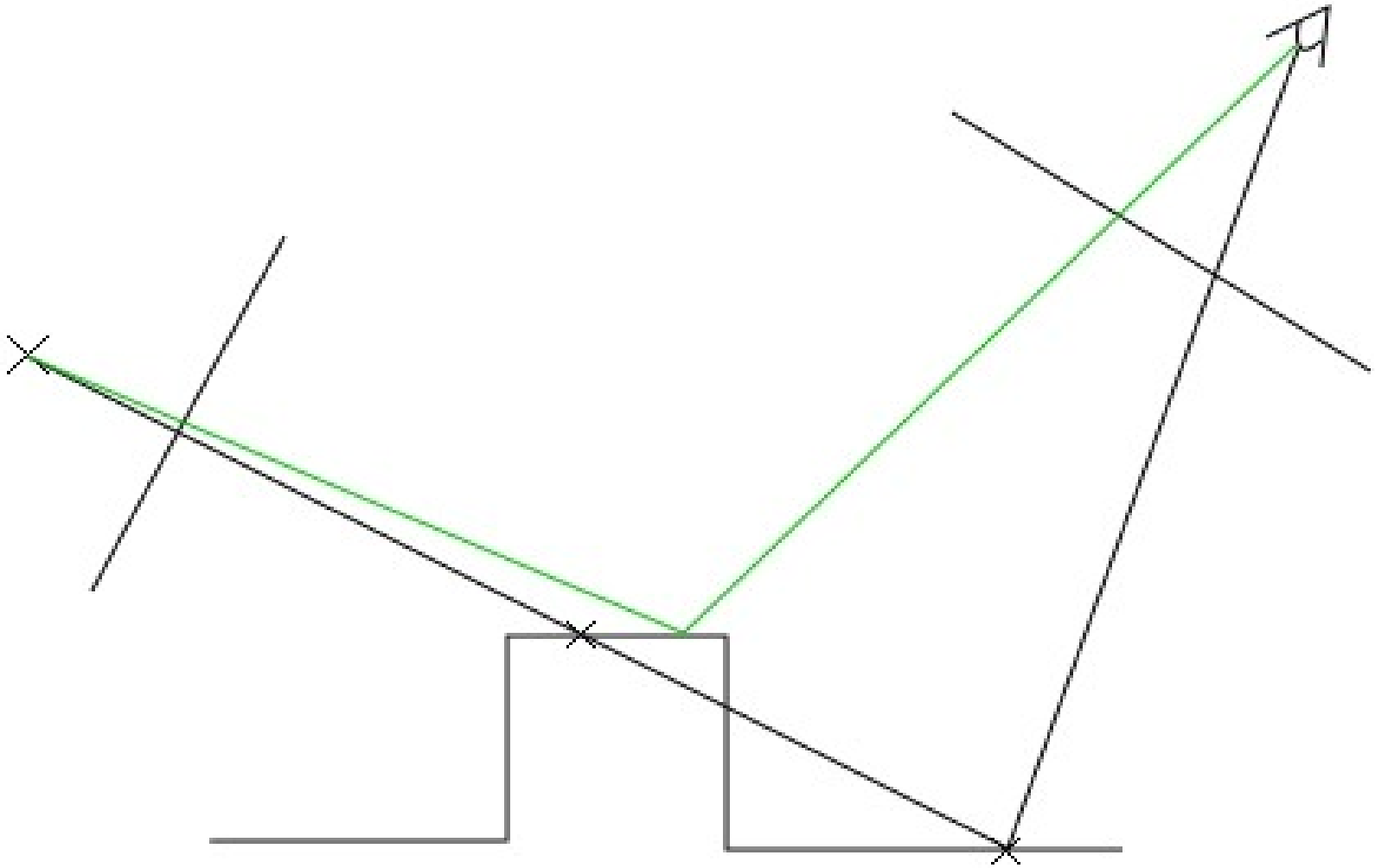
Why Shadows ?



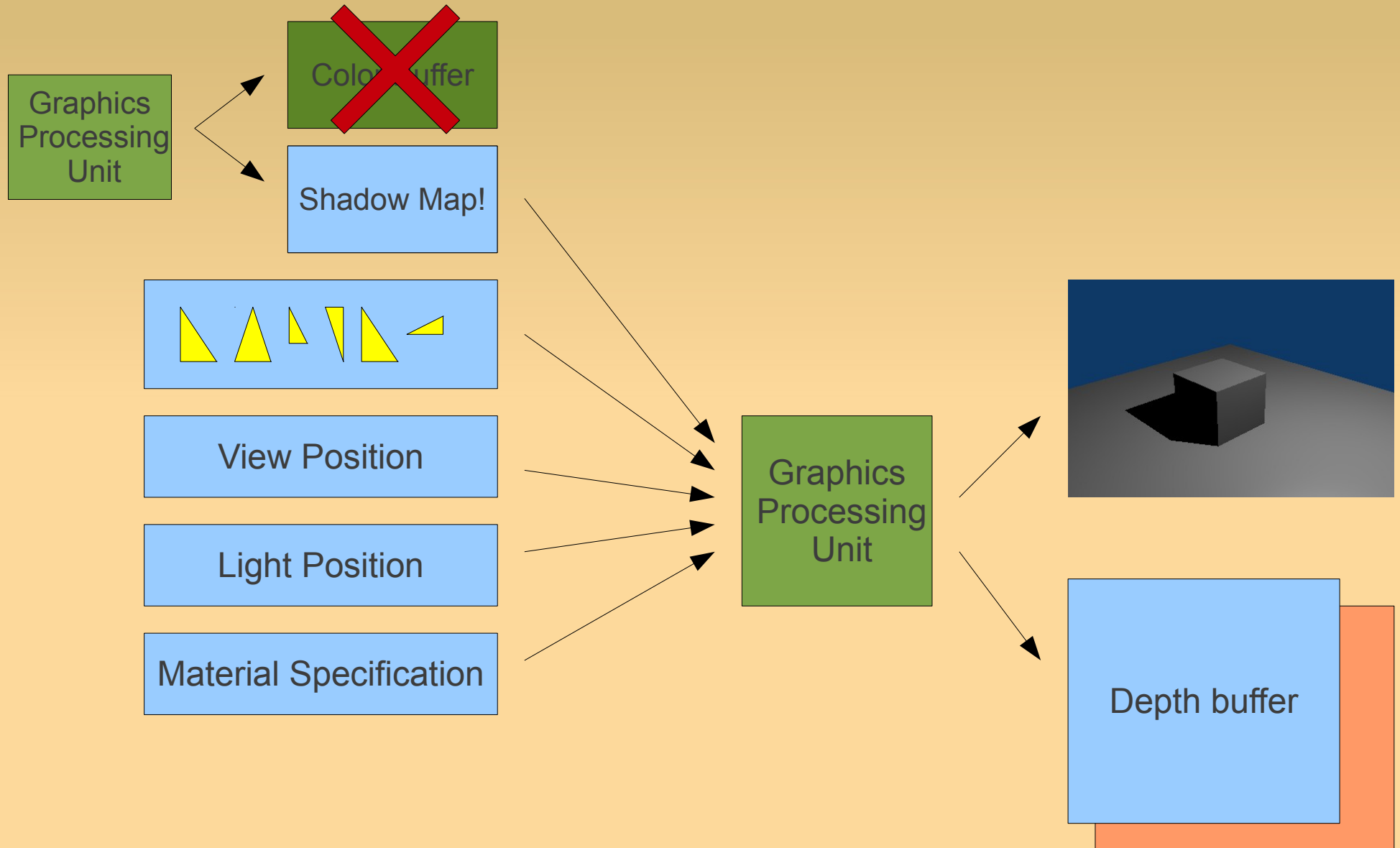
Shadow mapping: Step one.



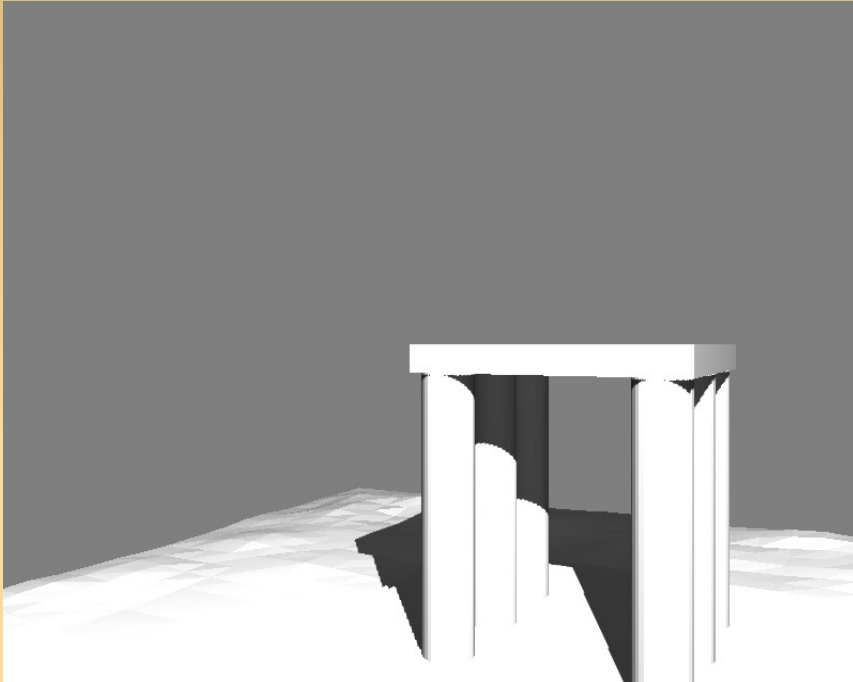
How does it work?



Shadow mapping: Step two.

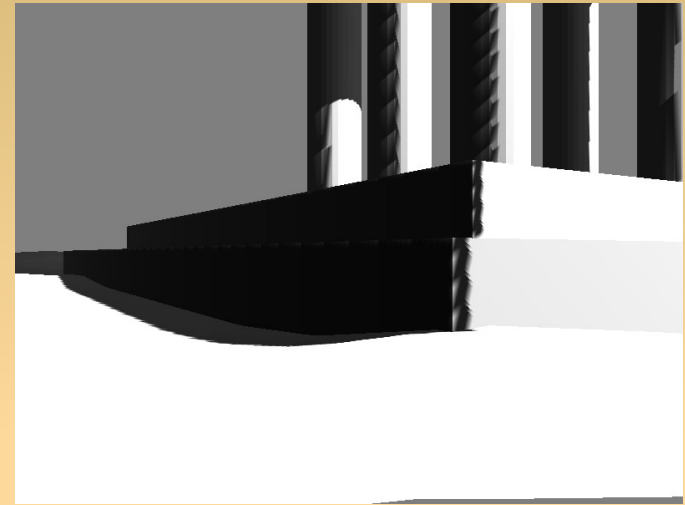
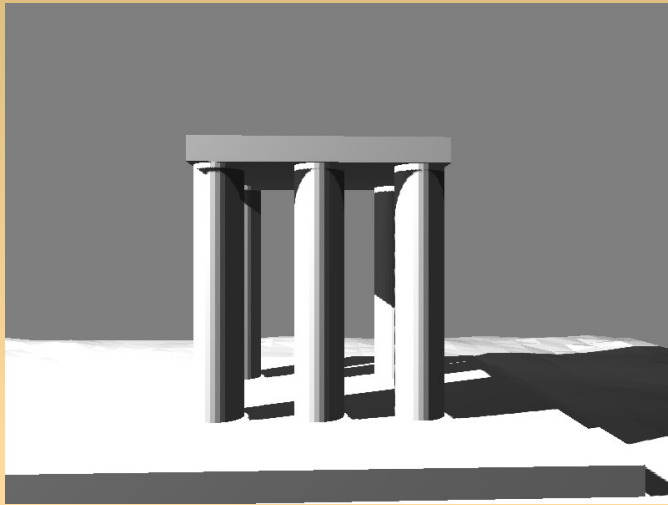


Strengths



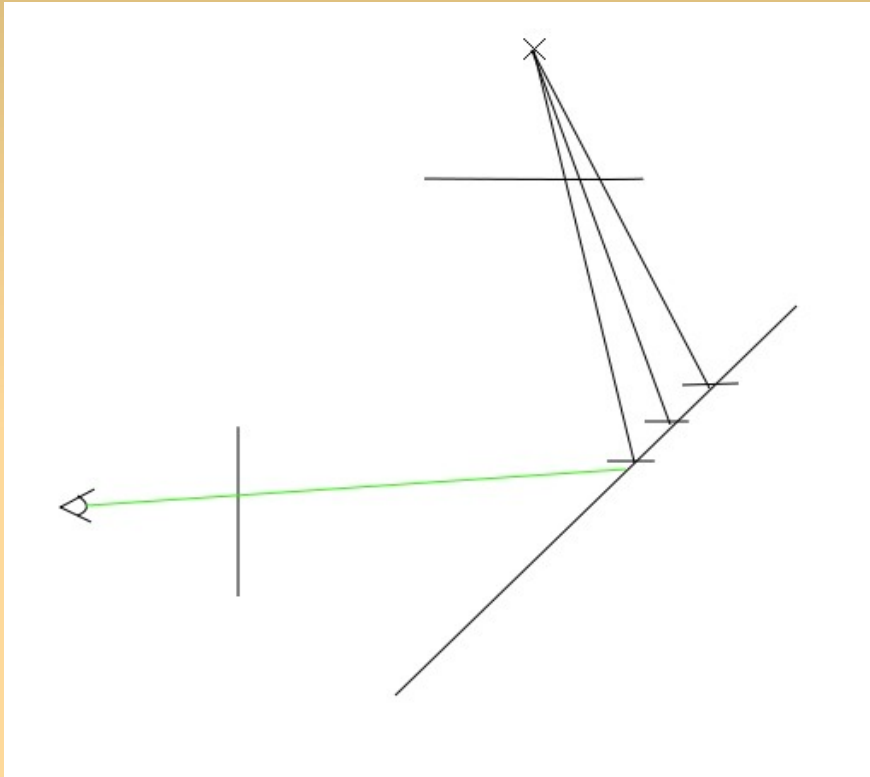
- Price/Performance ratio.
 - Linear cost in number of drawn “triangles”.
- Extensible.
- Simple.

Problems



- Detached shadows.
- Incorrectly shadowed surfaces.

Causes and possible solutions.



- Sampling related problems.
 - Increase shadowmap resolution.
 - Add small constant to “distances” in order to avoid self-shadowing.
 - Very unstable!

Even in professional products.



The end!

- We have seen...
 - Very high level introduction to Computer graphics.
 - How shadows enhance realism.
 - Shadow mapping.
 - Currently popular algorithm for generating shadows.
 - Good performance.
 - Reasonable results.
 - But unstable! (small changes to input...)
 - Research topic: see GPU Gems 3. GPU Pro. (new articles on the topic still popping up)