Fall 2012

Introduction to Computer Graphics

Exercise 2 - Raytracing

Laboratoire d'informatique Graphique et Géometrique

Computer Graphics and Geometry Laboratory

ÉCOLE POLYTECHNIQUE
FÉDÉRALE DE LAUSANNE

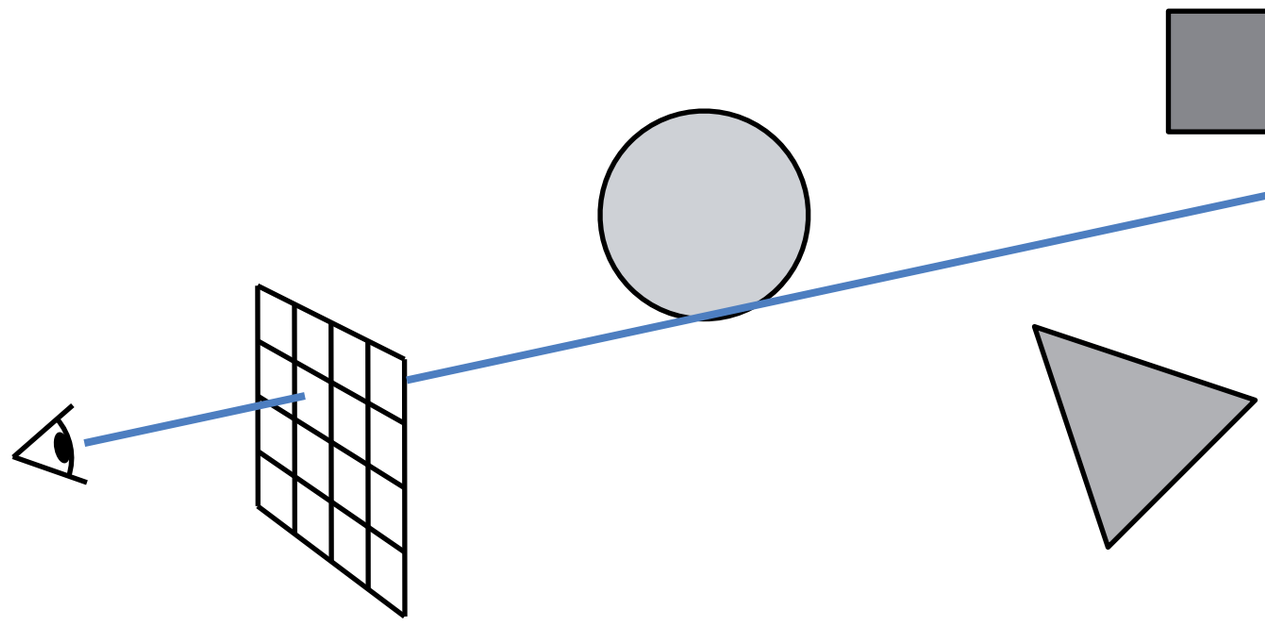
Wednesday, October 3, 12

General

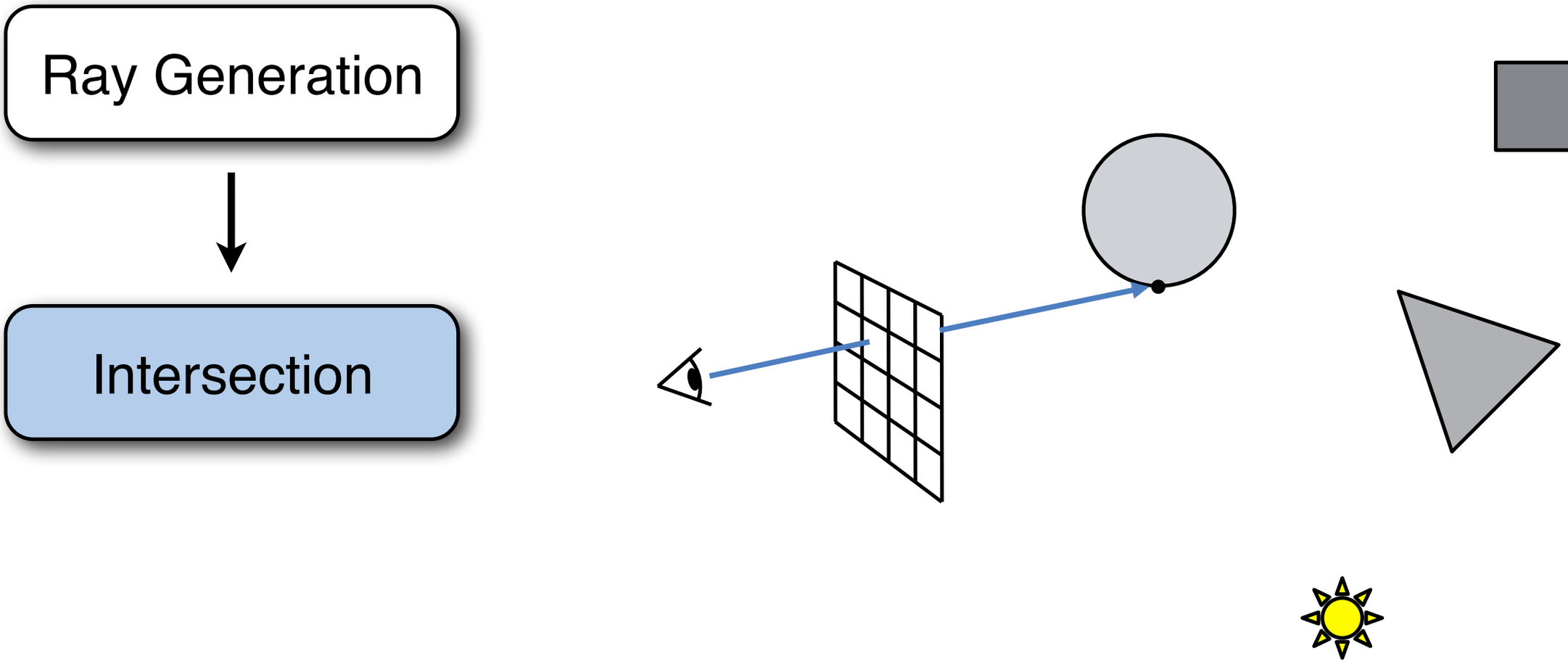
- Use our new framework, it contains code necessary for the last part of the exercise
- If you want to keep your code, copy the relevant parts to the new framework
- 2 weeks exercise
- Next week practical session about OpenGL project

Backward Raytracing

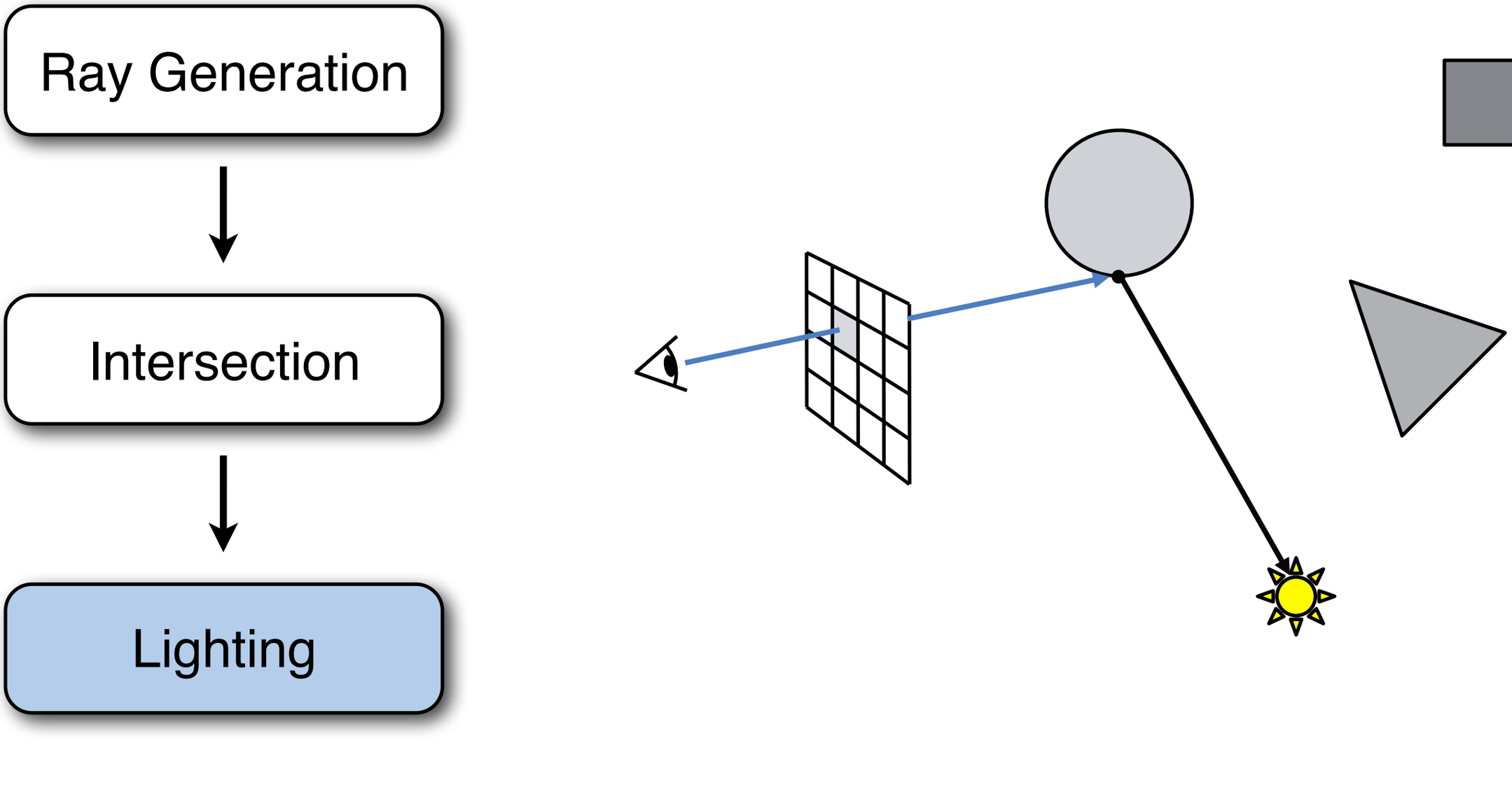
Ray Generation



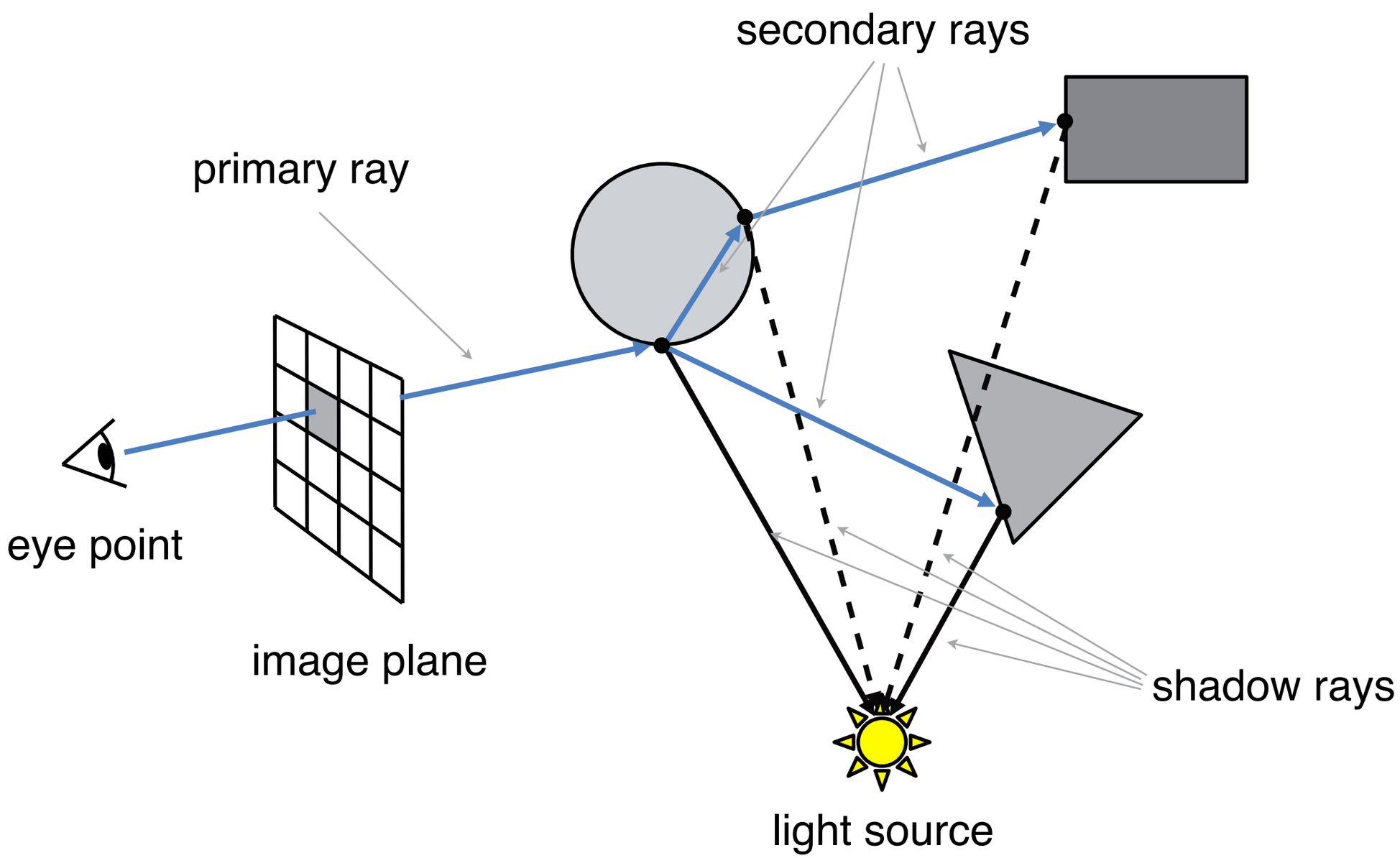
Backward Raytracing



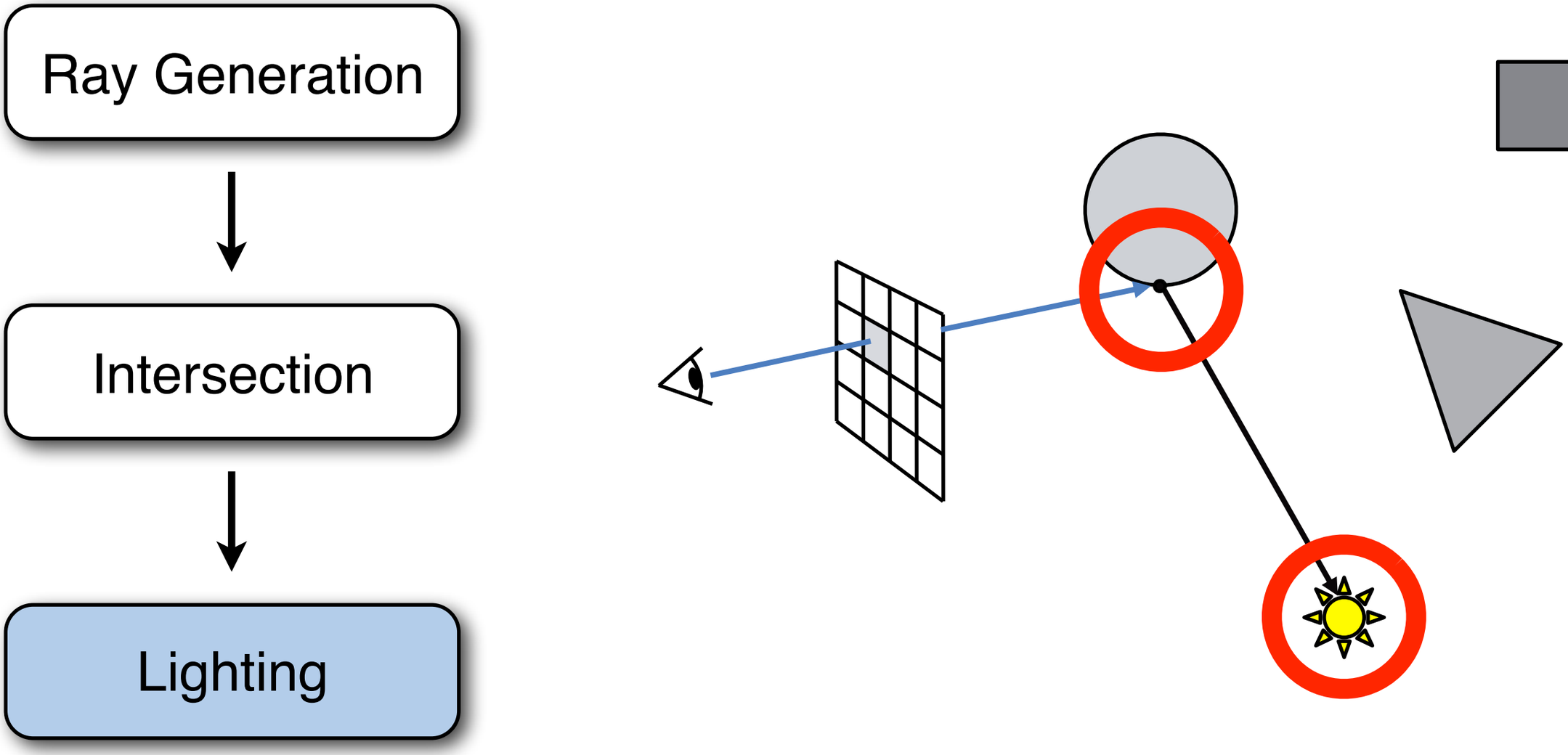
Backward Raytracing



Backward Raytracing



Shading



Shading

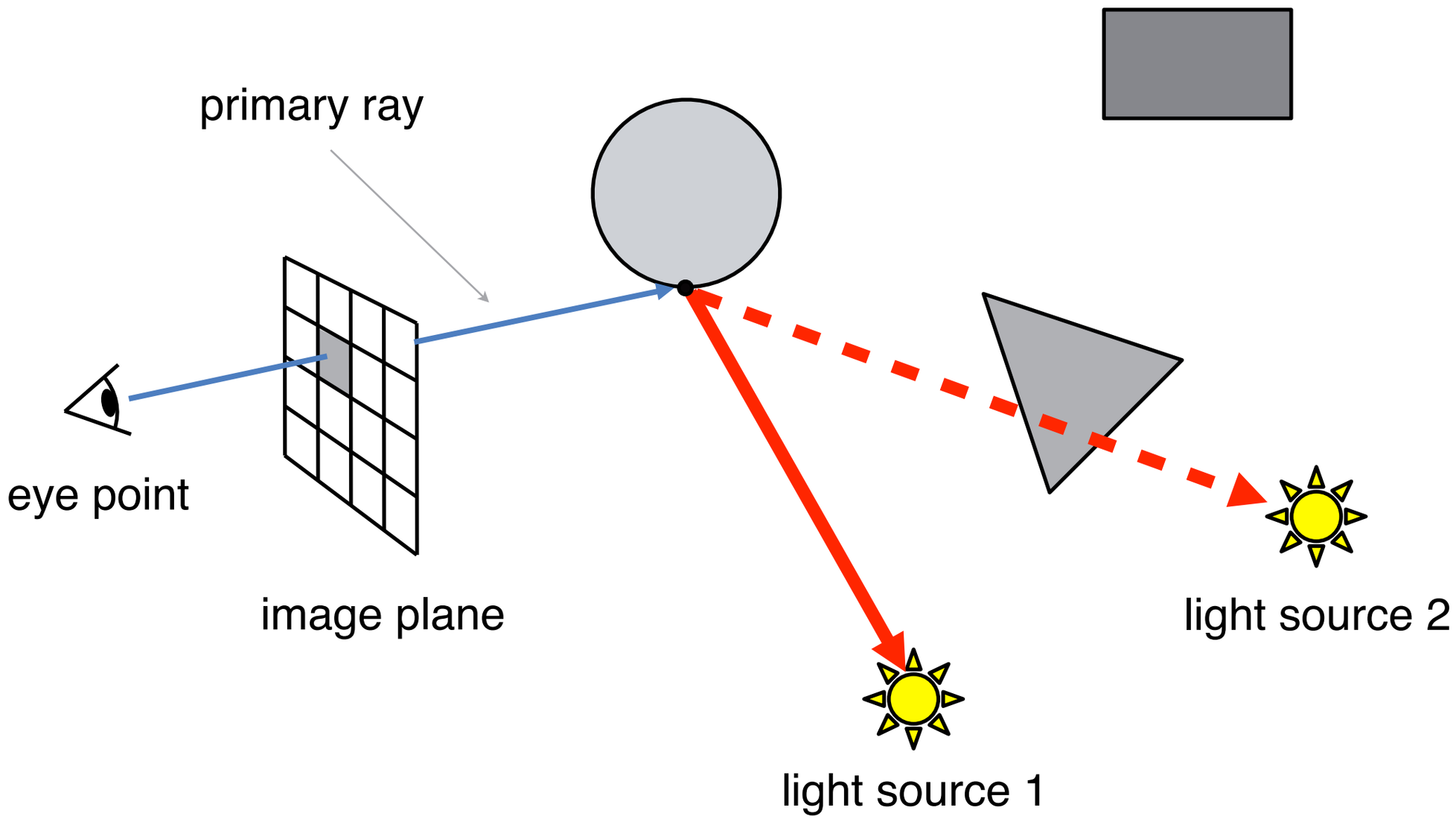
- Before: pixel color = color of surface
- Now: calculate pixel color from
  - surface material
  - light color
  - lighting direction

- IntersectionData needs normal, material and source point
- Shaders loop over light source:

```
//Get the light:
std::vector<Light*> lights = getSomeLightSources();

//Iterate through the list of lights:
for(std::vector<Light*>::iterator it=lights.begin(); it!=lights.end(); ++it)
{
  //Access the current light:
  Light* light = (*it);
```

Shadows


primary ray
eye point
image plane
light source 1
light source 2

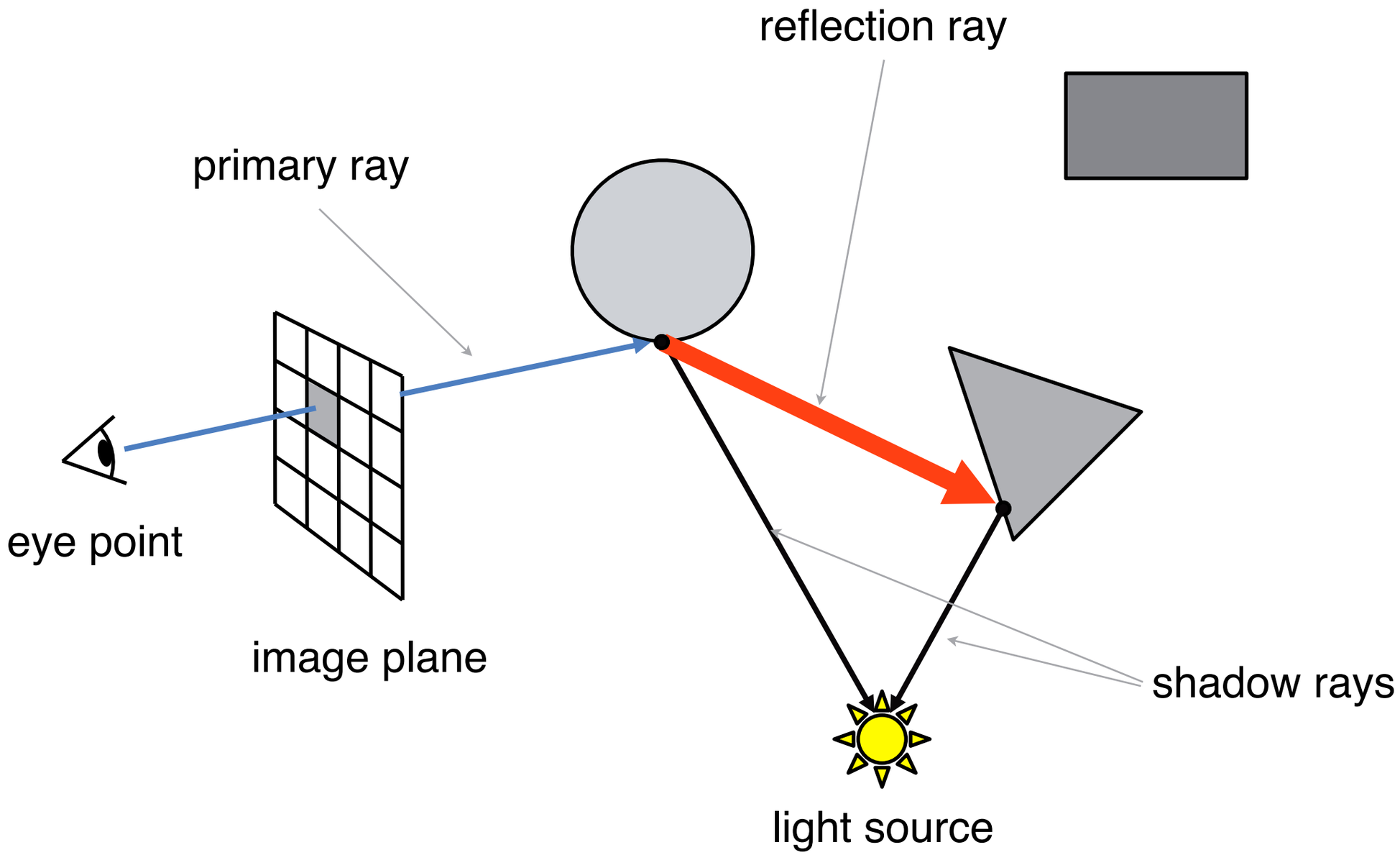
Shadows

- Intersection is faster because we do not have to find the first one
- Use ILight::generateRay() and Scene::fastIntersect()

- Add an element to the end of a vector:

```
myVector.push_back( myElement );
```

Reflection


reflection ray
primary ray
eye point
image plane
shadow rays
light source

Reflection

- Recursion (conceptual):

```
//trace the ray
Vector4 Renderer::traceColor(Ray ray, Scene* scene, unsigned int recDepth) {

    if ( //max. recursion depth is not reached )
    {
       //trace the recursive color/shading
      Vector4 reflectionColor=traceColor(reflectionRay,scene,recDepth+1);
    }
}
```

Contacts

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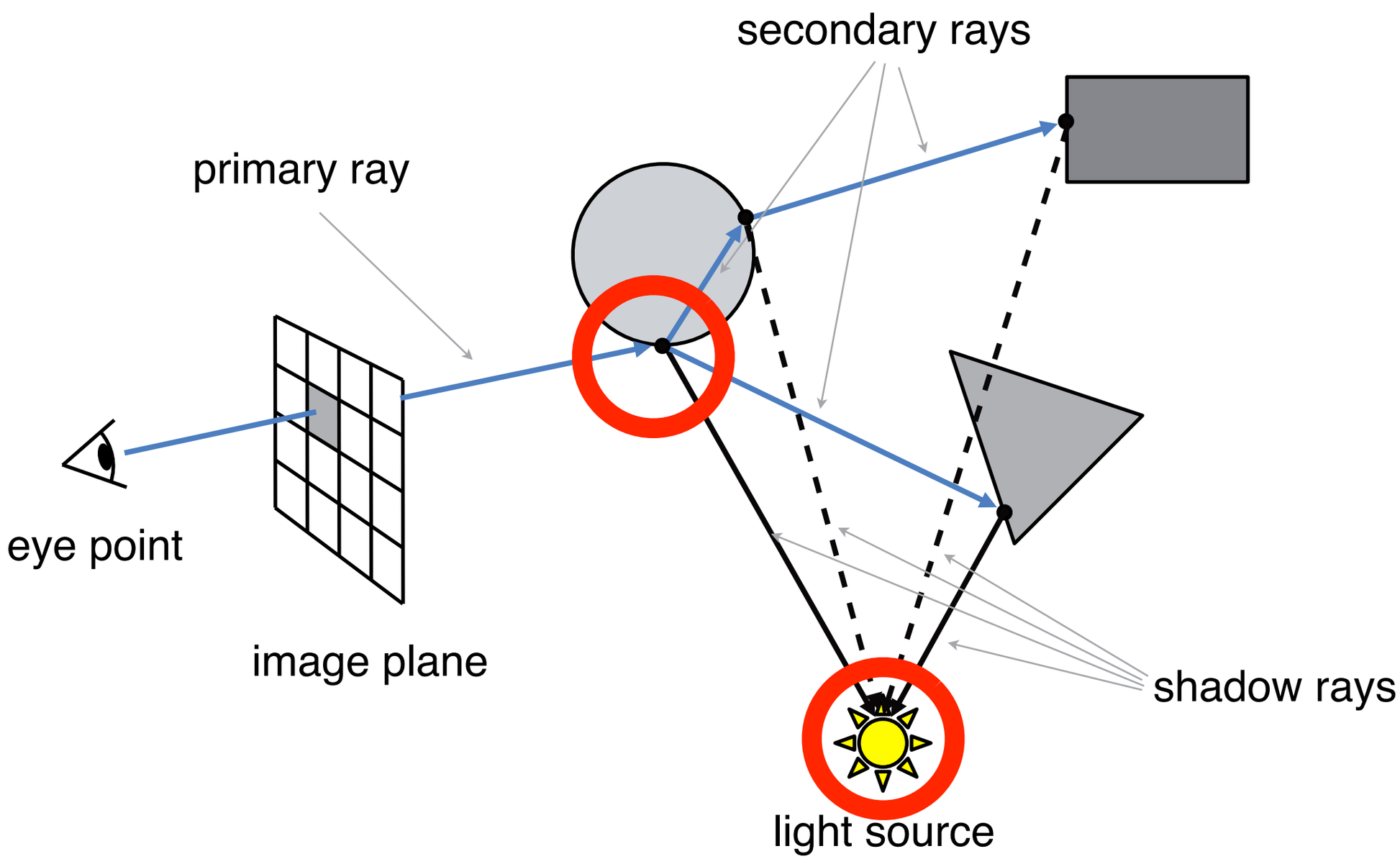
Shading


secondary rays
primary ray
eye point
image plane
shadow rays
light source