ITU - Graphics Programming

Exercise 10 – ray-tracing

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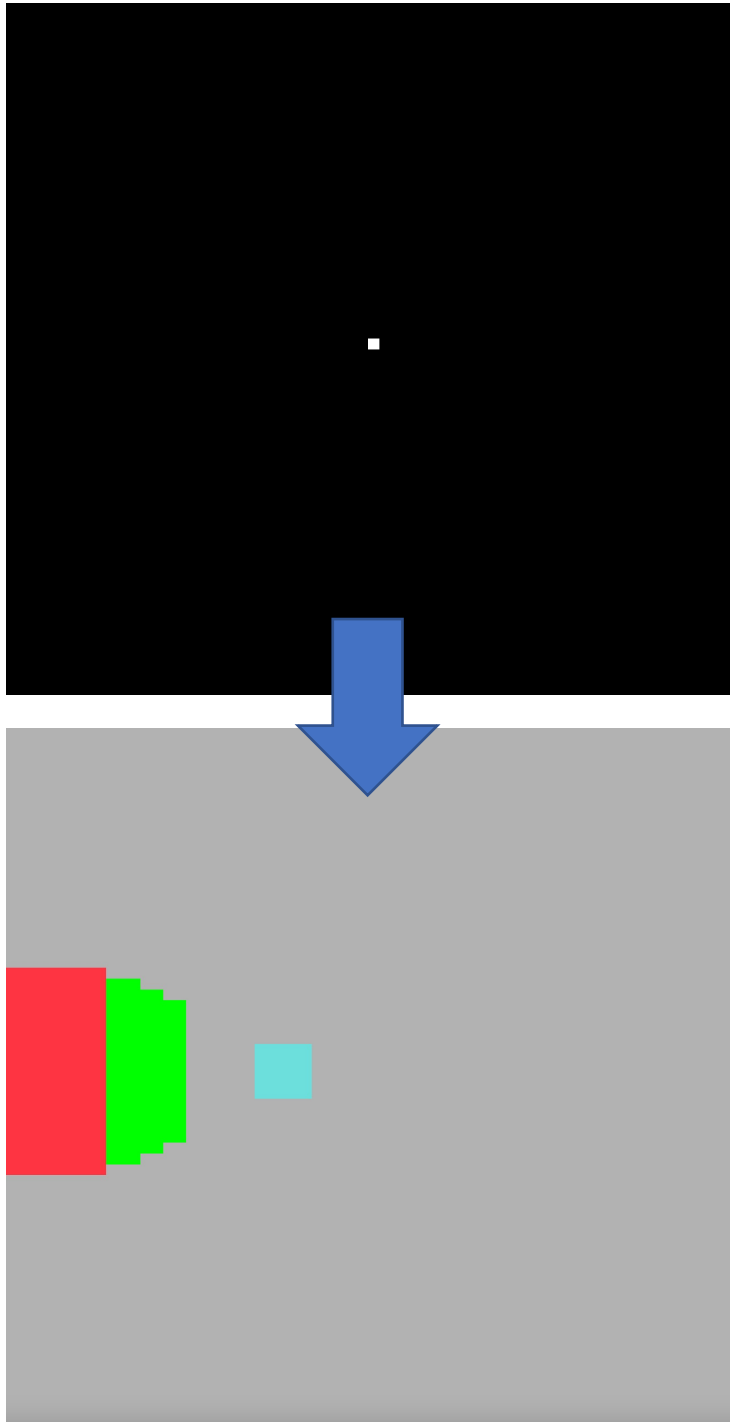
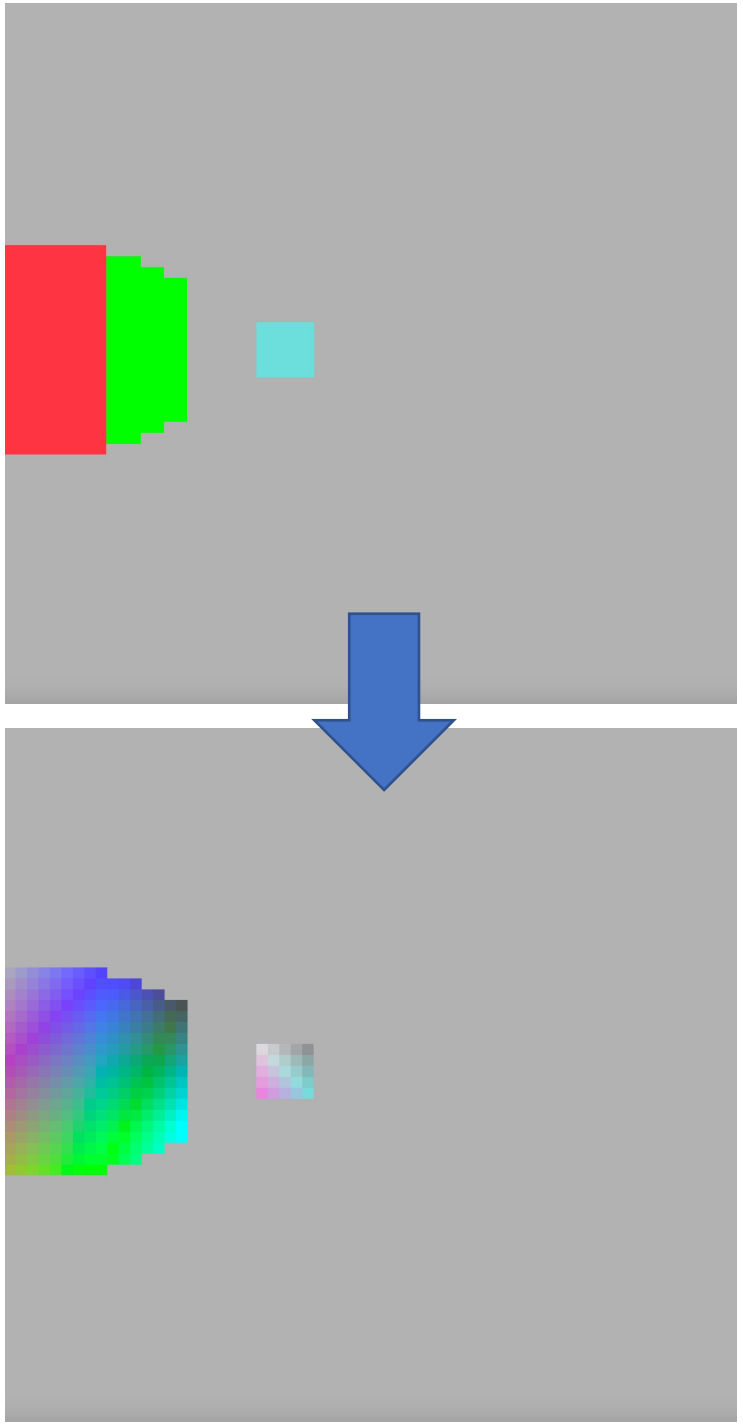
10.1 casting primary rays

- The application starts with a black screen and a single white pixel.
- Examine the methods in the rt_renderer.h file.
- Create the primary rays
  - Primary rays are the rays that are sent out from the projection convergence point (the camera position in our case)
  - Follow instructions in the “render” method in the rt_renderer.h file
- Notice that the small blue square in the resulting image is a reflection. It is hard to realize that if we don’t have lighting!



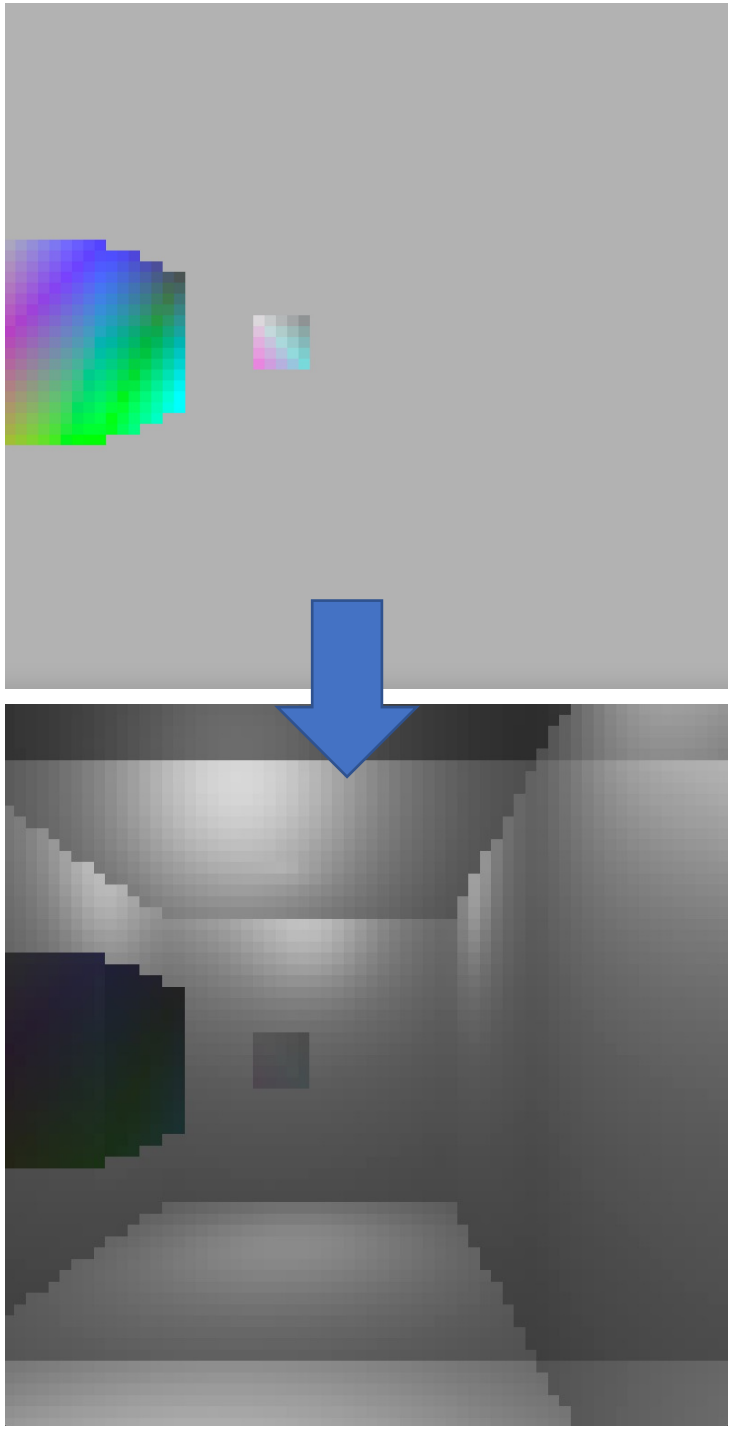
10.2 interpolation

- The RayModelIntersection function returns the barycentric coordinates of the triangle that was hit (if any).
- You should use these coordinates to interpolate colors and the normal of the current pixel.
- To access the vertices of the current triangle, you can use
  - vts[hitInfo.hit_ID],
  - vts[hitInfo.hit_ID+1] and
  - vts[hitInfo.hit_ID+2]
- Remember that the normal vector should be normalized!



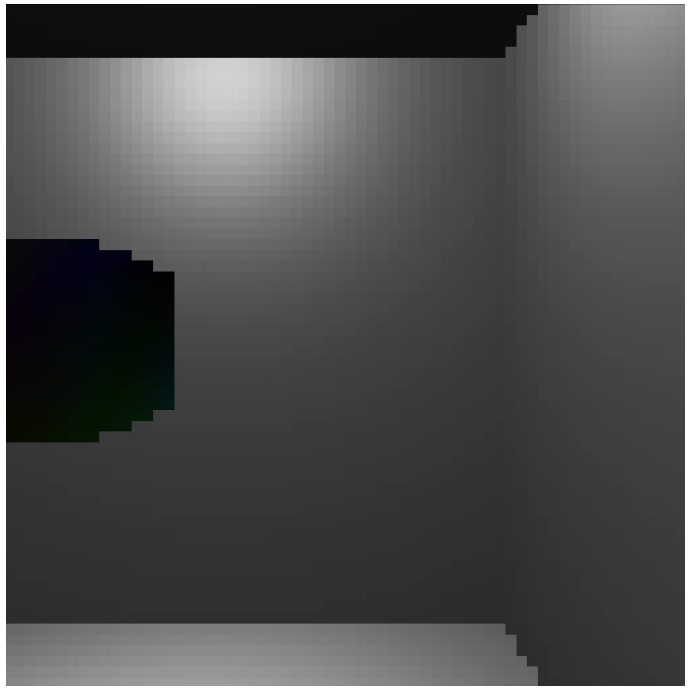
10.3 lighting

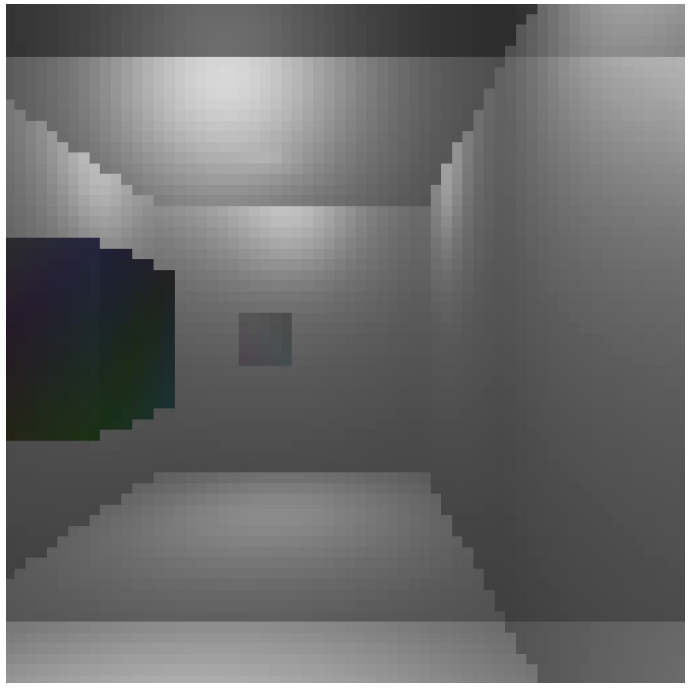
- Implement the Phong reflection model
- Replace col = i_col; with the light reflection that you have computed.

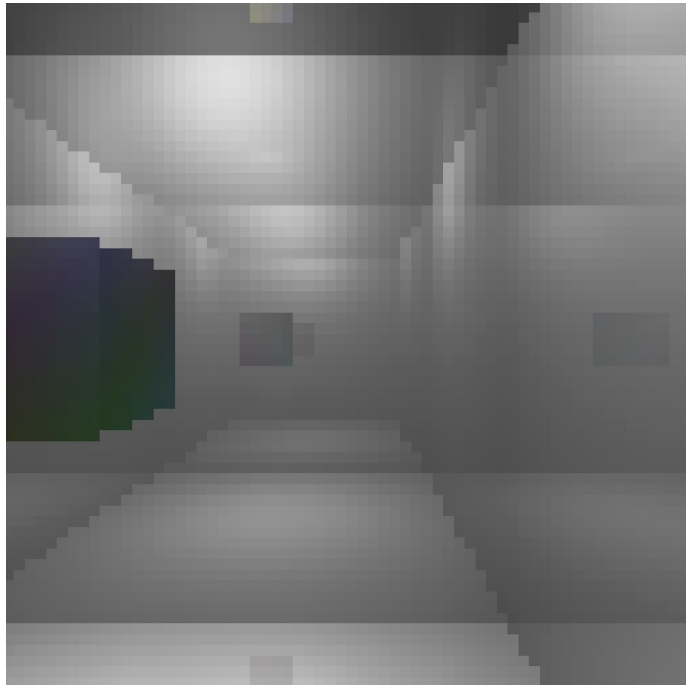


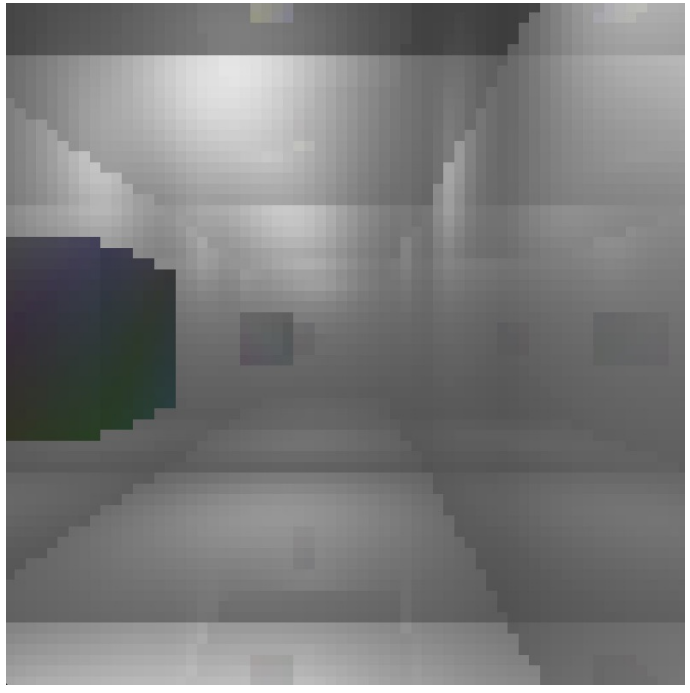
Final result

Key mapping:
1 - one intersection (aka ray-casting rendering)
2 - one reflection
3 - two reflections
4 - three reflections
5 - four reflections (not shown in the image)









10.4 shadows (optional)

- Check for light is occluded by any geometry before (this should approximatelly double the computation cost of your ray tracer!)

- (no screenshots for that, sorry)