Ray Tracing On GPU

網媒所 R06944013 楊子由

Outline

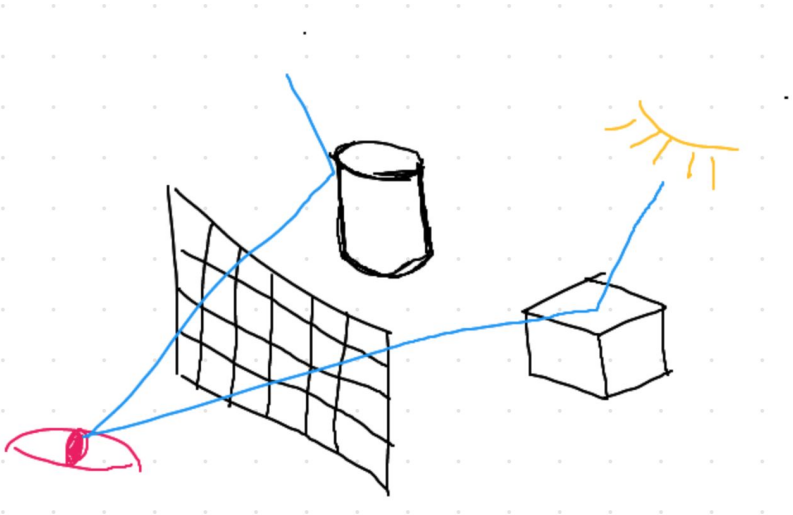
- Introduction
- Method
- Result
- Conclusion

Introduction - Ray Tracing

- Given a description of a scene
  - Camera
  - Objects
- Render a image

Introduction - Ray Tracing

- Trace ray from eye to object to light
- Every ray is independent



Method

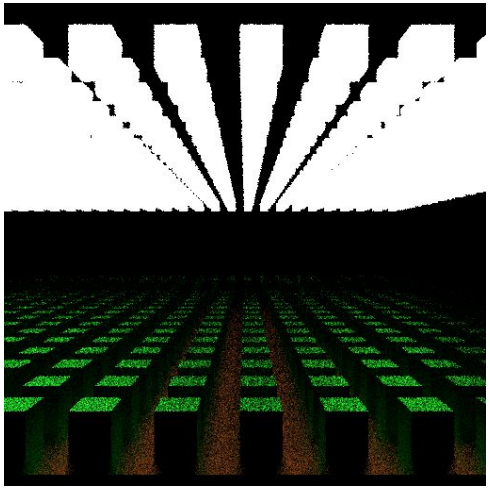
- Implement on CPU and GPU
- Scene
  - Cubes
  - 50x50x50
- Compare
  - CPU vs CPU Threading vs GPU

Info of CPU & GPU

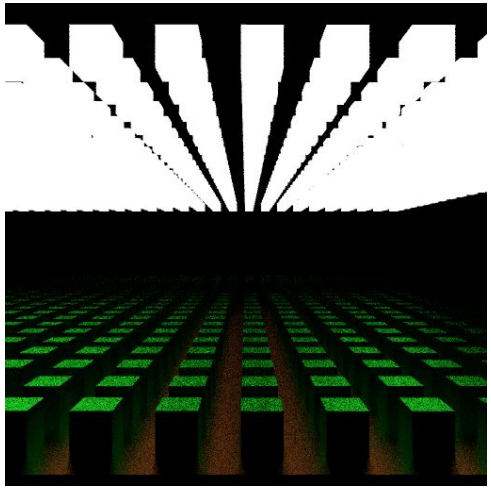
- CPU
  - CPU(s): 40
  - Thread(s) per core: 2
  - Core(s) per socket: 10
  - Socket(s): 2
- GPU
  - Tesla K80

Result

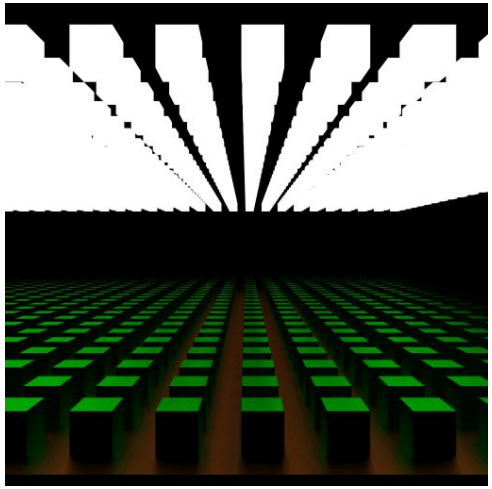
1 sample



4 samples



256 samples



Result - CPU Threading

Samples\Threading	1	2	4	8	16
1	1.42 (1)	0.82 (1.7)	0.44 (3.2)	0.25 (5.7)	0.21 (6.8)
4	5.28 (1)	2.74 (1.9)	2.08 (2.5)	1.11 (4.8)	0.62 (8.5)
9	11.95 (1)	6.27 (1.9)	3.45 (3.5)	1.81 (6.6)	1.29 (9.3)
16	21.00 (1)	11.41 (1.8)	5.96 (3.5)	4.28 (4.9)	2.22 (9.5)
25	32.46 (1)	18.50 (1.8)	9.64 (3.4)	4.72 (6.9)	3.44 (9.4)

Result - CPU v.s. GPU

Samples\Type	CPU(1 Thread)	GPU
1	1.42 (1)	0.23 (6.2)
4	5.28 (1)	0.85 (6.2)
16	21.00 (1)	3.24 (6.5)
256	348.10 (1)	51.21 (6.8)

Result - CPU v.s. GPU

Samples\Type	CPU(16 Threads)	GPU
1	0.21 (1)	0.23 (0.9)
4	0.61 (1)	0.85 (0.7)
16	2.26 (1)	3.24 (0.7)
256	23.86 (1)	51.21 (0.5)

Conclusion

- CPU Threading :
  - Recursive depth of each ray isn’t the same.
- GPU
  - Not fast