



A SIMPLE RAY TRACER

A SLIGHTLY BETTER RAY TRACER

AN ANIMATED RAY TRACER

AN AWESOME RAY TRACER

SIMPLE

BETTER

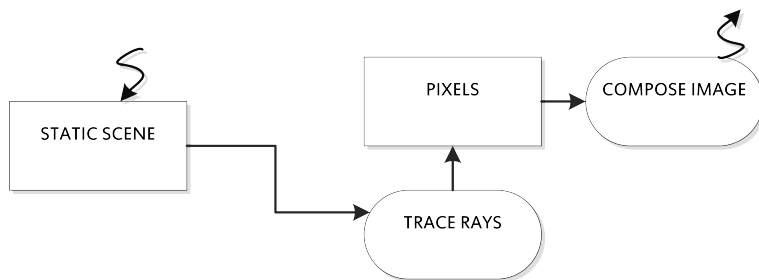
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AWESOME

# A SIMPLE RAY TRACER

RAY TRACING IN  
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STATE  
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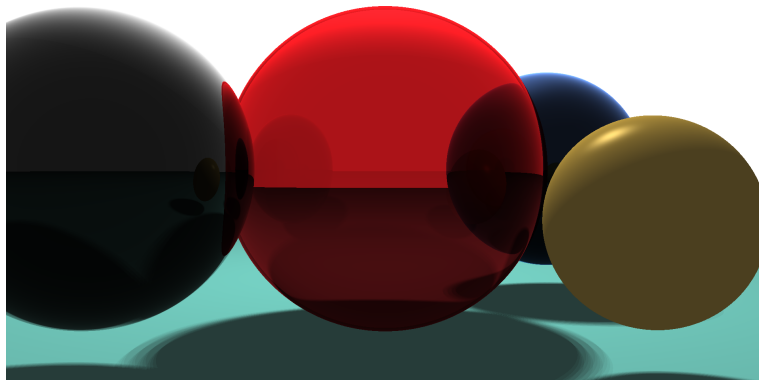
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- ▶ 1080x1920
- ▶ 2073600 pixels
- ▶ 2073600  $\times$  4  $\times$  4 initial rays
- ▶ **23.9314** seconds to compute
- ▶ **1** instance of the trace rays step

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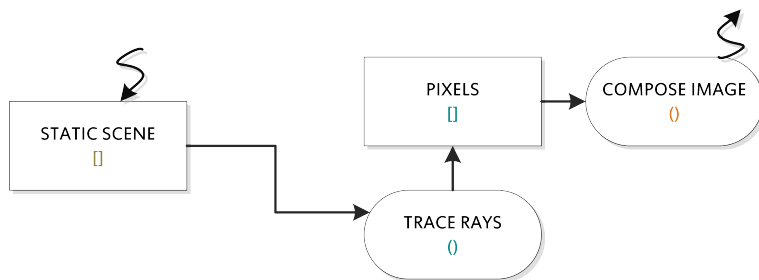
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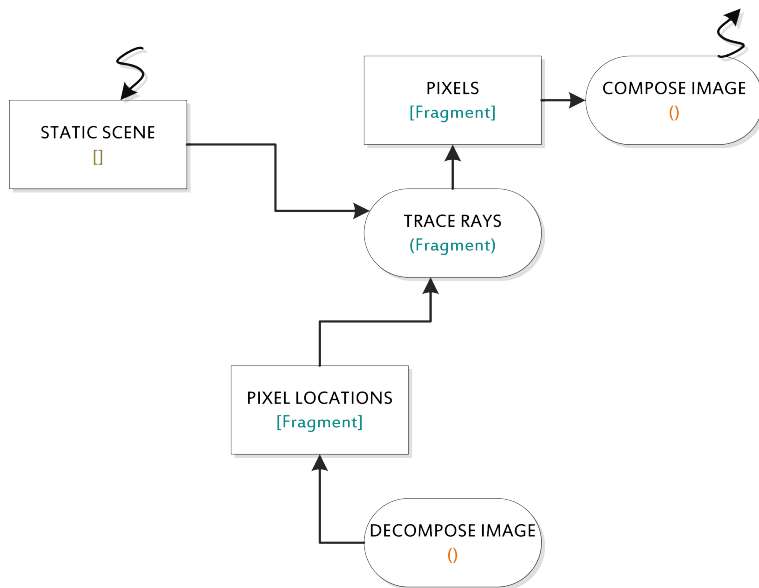
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# A SLIGHTLY BETTER RAY TRACER



# A SLIGHTLY BETTER RAY TRACER

- ▶ 1080x1920
- ▶ 2073600 pixels
- ▶ 2073600  $\times$  4  $\times$  4 initial rays split amongst 8 fragments (259200 pixels each)

1	2	3	4
2.86122	5.78101	3.40776	5.82813
5	6	7	8
7.89721	7.67004	8.41823	5.80659

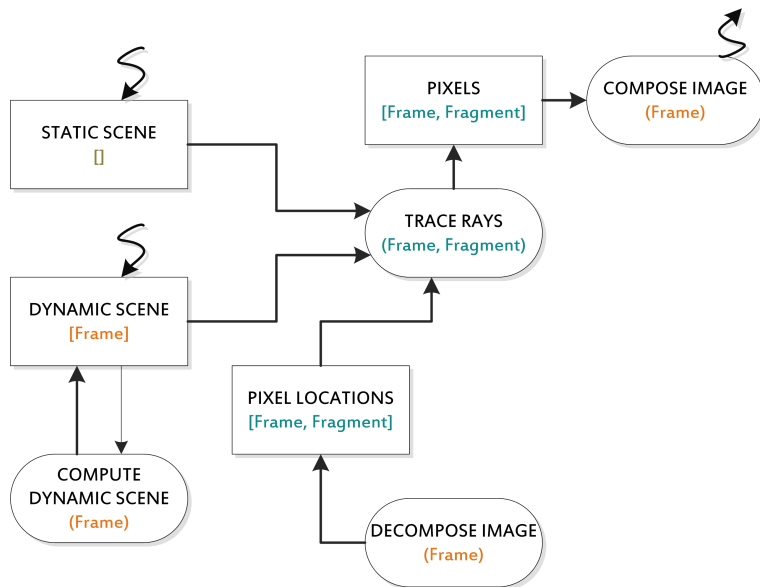
- ▶ **6.19** average seconds to compute
- ▶ **8** instances of the trace rays step



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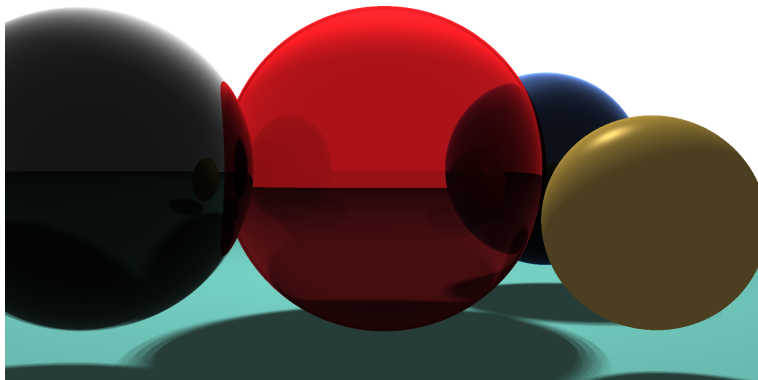
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# AN ANIMATED RAY TRACER

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- ▶  $1080 \times 1920 \times 10$  frames
- ▶ 2073600 pixels per frame
- ▶  $2073600 \times 4 \times 4$  initial rays per frame split amongst 8 fragments (259200 pixels each)
- ▶ **6.19** average seconds to compute
- ▶ **80** instances of the trace rays step

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# COMPUTATION TIME PER FRAGMENT

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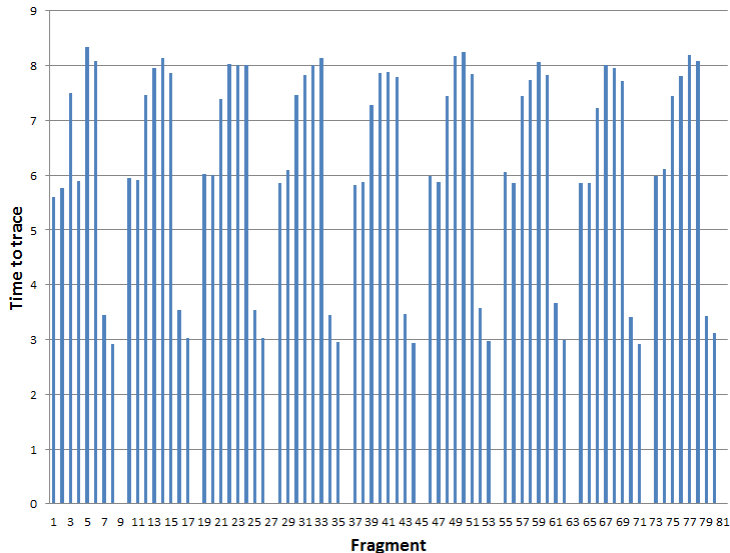
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- ▶ Producing high definition images at around 6 seconds per frame, not bad!
- ▶ A standard deviation of 1.9 hurts the actual time per frame, 8.12
- ▶ But... what if we dynamically assign the pixels based on the previous computation time?

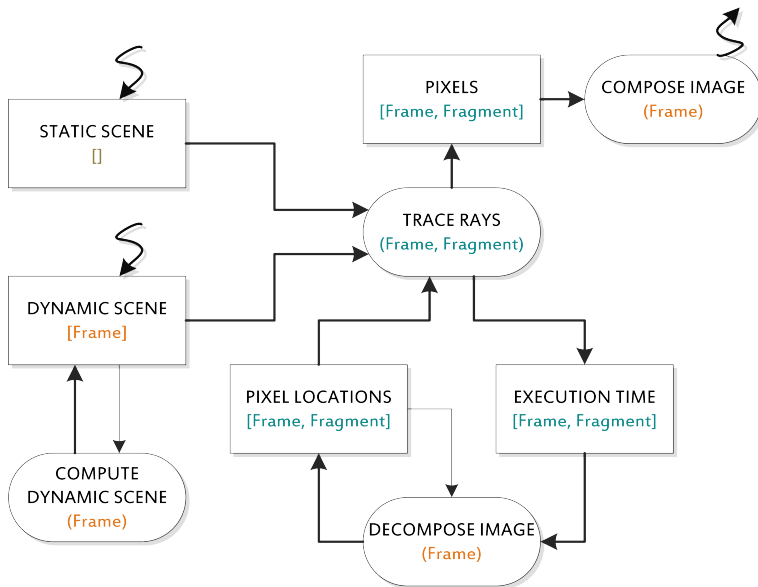
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# AN AWESOME RAY TRACE



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# COMPUTATION TIME PER FRAGMENT

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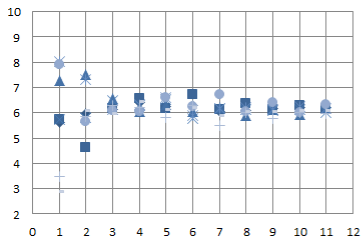
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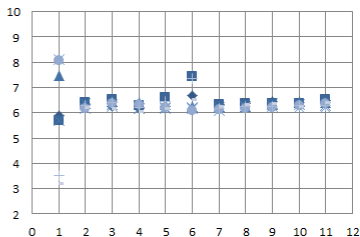
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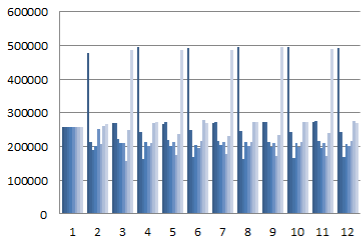
Execution Time per Frame (Sequential Picking)



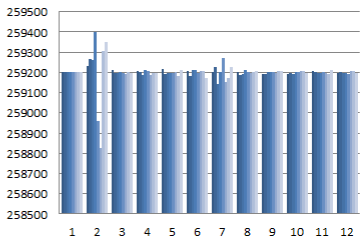
Execution Time per Frame (Random Picking)



Pixels per Frame per Bin (Sequential Picking)



Pixels per Frame per Bin (Random Picking)



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- ▶ Tested using two different algorithms, sequential and random picking
- ▶ Statistics were taken after the first iteration

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case	average	worst	best	sdd
no fragments	<b>6.16</b>			
constant size	6.19	8.35	<b>2.91</b>	1.90
sequential picking	6.17	7.51	4.62	0.35
random picking	6.32	<b>7.44</b>	6.05	<b>0.21</b>