

# **BUILDING FOR PERFORMANCE & RESILIENCE**

**@andyhume**

SmashingConf, New York, 2014

# WHY CARE?

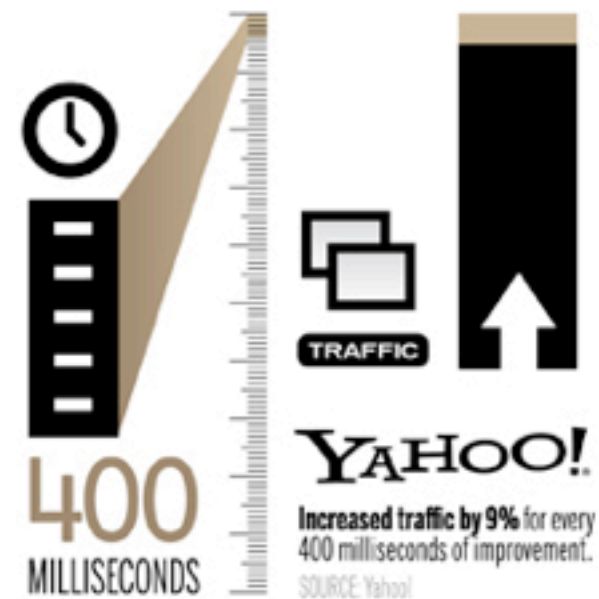
<http://www.strangeloopnetworks.com/resources/infographics/web-performance-and-ecommerce/>

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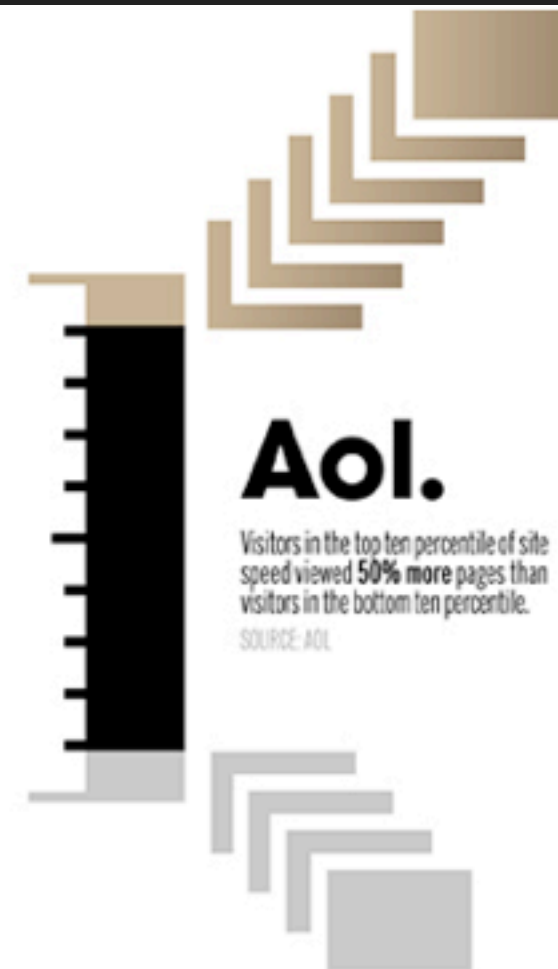


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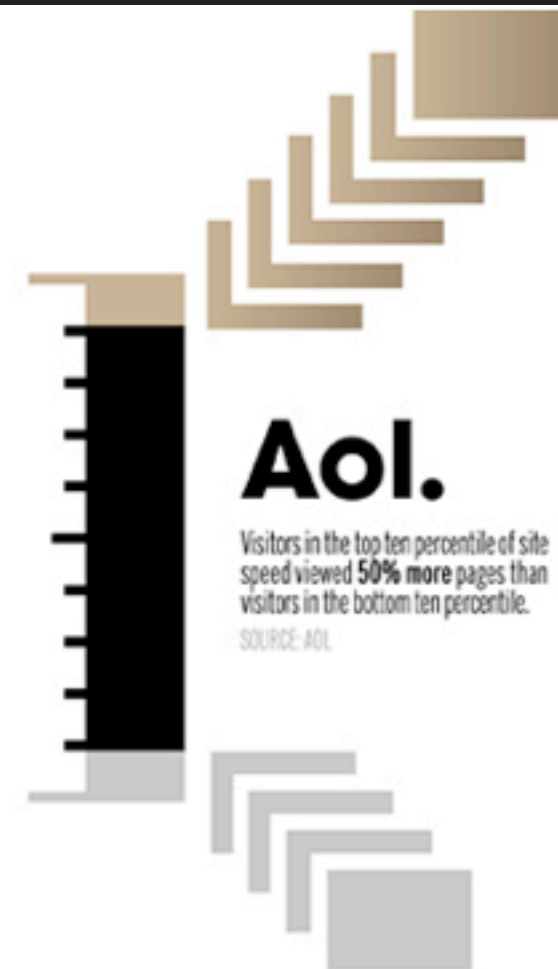
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# Measure

<http://www.flickr.com/photos/kayaker1204/4319542459/>



The background of the slide features a close-up, high-contrast photograph of a yellow measuring tape. The tape is coiled and draped over a dark, textured surface, possibly wood or stone. The numbers on the tape are clearly visible, with '15', '16', '21', '22', '117', '118', '119', and '120' being prominent. The lighting creates strong highlights and shadows, emphasizing the texture of the tape and the surface it lies on.

# Tell a story

*We have a median page load time of seven seconds, and our primary competitor has a median page load time of three seconds.*

# Measure

<http://www.flickr.com/photos/kayaker1204/4319542459/>



A coiled yellow measuring tape is the central visual element, resting on a dark, textured surface. The tape is unrolled in a circular pattern, showing various measurements in inches and centimeters. The numbers are printed in black on the yellow tape. The background is dark and has a rough, stone-like texture. The overall lighting is dim, with a slight highlight on the top edge of the tape.

Tell a story

*Page load times increased by 25% when we added feature x.*

Measure

<http://www.flickr.com/photos/kayaker1204/4319542459/>





Your bosses love a story

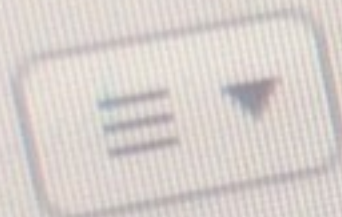
<http://www.flickr.com/photos/kayaker1204/4319542459/>



To: perf@guperf.com

Cc:

Subject: Performance: Weekly update



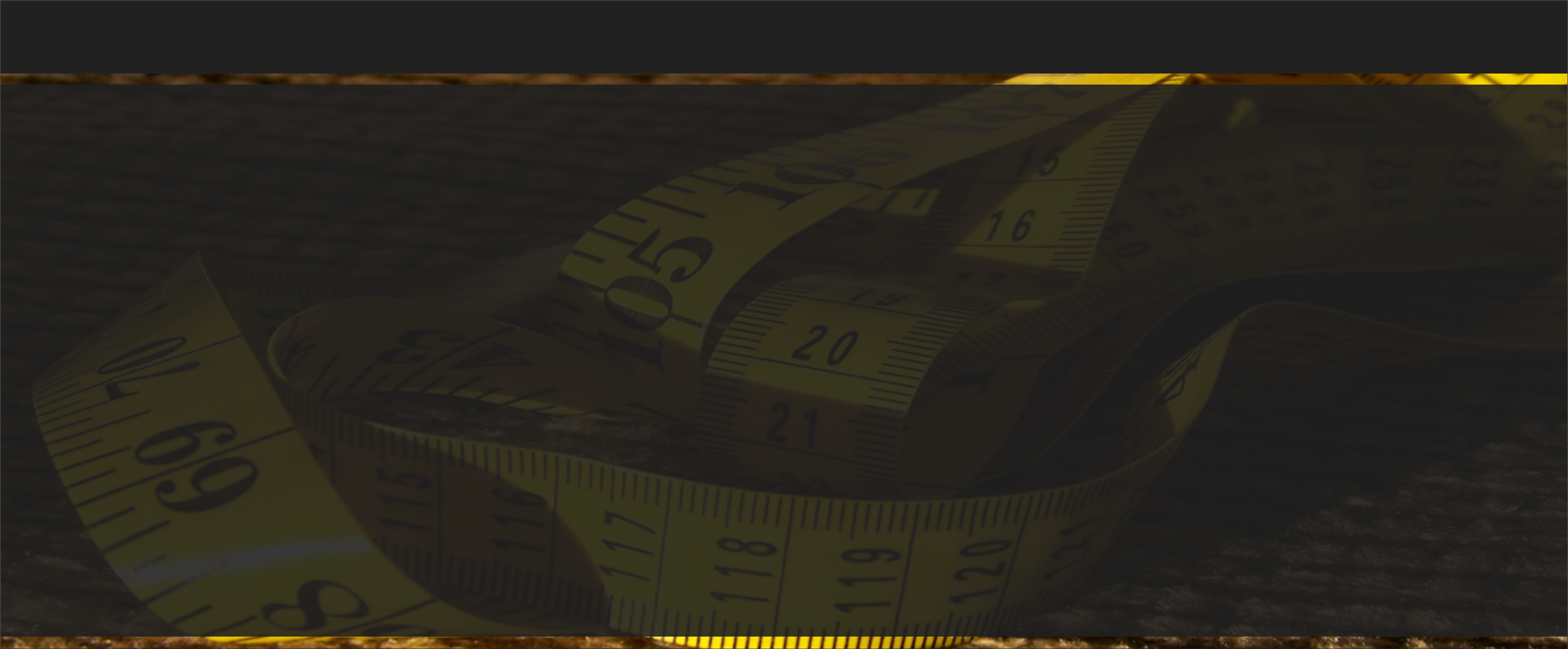
Hi all,

Attached are our latest web performance metrics and trends.

Spread the word

<http://www.flickr.com/photos/kayaker1204/4319542459/>





# What numbers?!

<http://www.flickr.com/photos/kayaker1204/4319542459/>





Total download size?

Time to first byte?

Response time?

Start render time?

Page load time?

Document load time?

Total HTTP requests?

**What** numbers?!

<http://www.flickr.com/photos/kayaker1204/4319542459/>





Search

Edition: [US](#) [UK](#) [AU](#)



Sign in



Sunday  
15 June 2014



Last updated:  
31 seconds ago



## Iraq crisis: Republican senator calls for US-Iran coordination

190

Senator Lindsey Graham: 'If Baghdad falls, a disaster awaits us' and GOP leaders say Isis represents 'greatest threat since 9/11'

Iran and US face common foe in effort to stop Isis fighters in Iraq

US sends aircraft carrier to Gulf as Obama considers air strikes in Iraq

Captured Iraqi soldiers 'murdered by militants'

Iran sends troops into Iraq to aid fight against Isis militants



## Tony Blair: west must intervene in Iraq

2063

Ex-PM says allies should consider military options short of sending troops after denying 2003 invasion led to Isis crisis

Blair rejects claims 2003 invasion of Iraq caused current crisis



## Israeli forces tighten grip on West Bank in search for three abducted teenagers

Netanyahu accuses Hamas of being behind kidnap as troops flood into

Hebron and hundreds of reservists are called up



## Ukraine minister's abusive remarks about Putin raise tensions

Andriy Deshchytsia caught swearing about Russian president while trying to placate protesters outside

embassy in Kiev

Stay open ☒


**hitto!** @hittoga 5m


### Details


**Daniel Gerber** @GlasgowOsteo 2d  
@andyhume Thanks just never noticed before.



# Test a website's performance

 Analytical Review

 Visual Comparison

 Traceroute

http://www.theguardian.com

START TEST

Test Location

Dulles, VA USA (IE 8-11, Chrome, Firefox, Android, iOS)

Select from Map

Browser

iPhone 4 iOS 5.1

Advanced Settings ▶

1 run, Shaped 3G connection, results are public

Run a free website speed test from multiple locations around the globe using real browsers (IE and Chrome) and at real consumer connection speeds. You can run simple tests or perform advanced testing including multi-step transactions, video capture, content blocking and much more. Your results will provide rich diagnostic information including resource loading waterfall charts, Page Speed optimization checks and suggestions for improvements.

If you have any performance/optimization questions you should visit the [Forums](#) where industry experts regularly discuss Web Performance Optimization.





## Test a website's performance

## Analytical Review

### Visual Comparison

## Traceroute

<http://www.theguardian.com>

### Test Location

## Browser

### Advanced Settings ▶

1 run, Shaped 3G connection, re

IE 8

IE 9

IE 10

IE 11

✓ Chrome

## Canary

Firefox

## Firefox Nightly

### Safari (Windows)

iPhone 4 iOS 5.1

## Nexus S Android 2.3

## Motorola G – Chrome

## Motorola G – Chrome Beta

## Nexus 5 – Chrome

## Nexus 5 – Chrome Beta

## Motorola E – Chrome

## Motorola E – Chrome Beta

## Nexus 7 – Chrome

## Nexus 7 - Chrome Beta

## Nexus 7 Landscape – Chrome

## Nexus 7 Landscape – Chrome Beta

```
void iOS)
```

### Select from Map



browsers (IE and Chrome) and at real consumer  
ing multi-step transactions, video capture, content  
uding resource loading waterfall charts, Page

where industry experts regularly discuss Web

Run a free website speed test for your connection speeds. You can run tests for blocking and much more. Your website speed optimization checks and

If you have any performance/op  
Performance Optimization.

Advanced Settings ▼

Test Settings

Advanced

Chrome

Auth

Script

Block

SPOF

Custom

Connection

Cable (5/1 Mbps 28ms RTT)

Number of Tests to Run

9

Up to 9

Repeat View



First View and Repeat View



First View Only

Capture Video



Keep Test Private



Label



Advanced Settings ▼

Test Settings

Advanced

Chrome

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Script

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First View and Repeat View



First View Only

Capture Video



Keep Test Private



Label

START TEST

Performance Results (Median Run)

	Load Time	First Byte	Start Render	User Time	<u>Speed Index</u>	DOM Elements	Document Complete			Fully Loaded		
							Time	Requests	Bytes In	Time	Requests	Bytes In
First View ( <u>Run 7</u> )	3.783s	0.128s	0.676s	1.998s	1522	1254	3.783s	81	1,305 KB	6.530s	127	1,588 KB
Repeat View ( <u>Run 6</u> )	2.268s	0.486s	0.486s	0.765s	980	1118	2.268s	31	130 KB	3.617s	43	278 KB

Plot Full Results

	Load Time	First Byte	Start Render	Fully Loaded	Speed Index
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# Measure and tracking trends

<http://www.flickr.com/photos/kayaker1204/4319542459/>



MEDIAN START RENDER TIME

BACKEND | START RENDER | DOM | FULLY LOADED | SPEEDINDEX

Guardian

0.9s

Median over last 14 days. Average was 1s.

NY Times

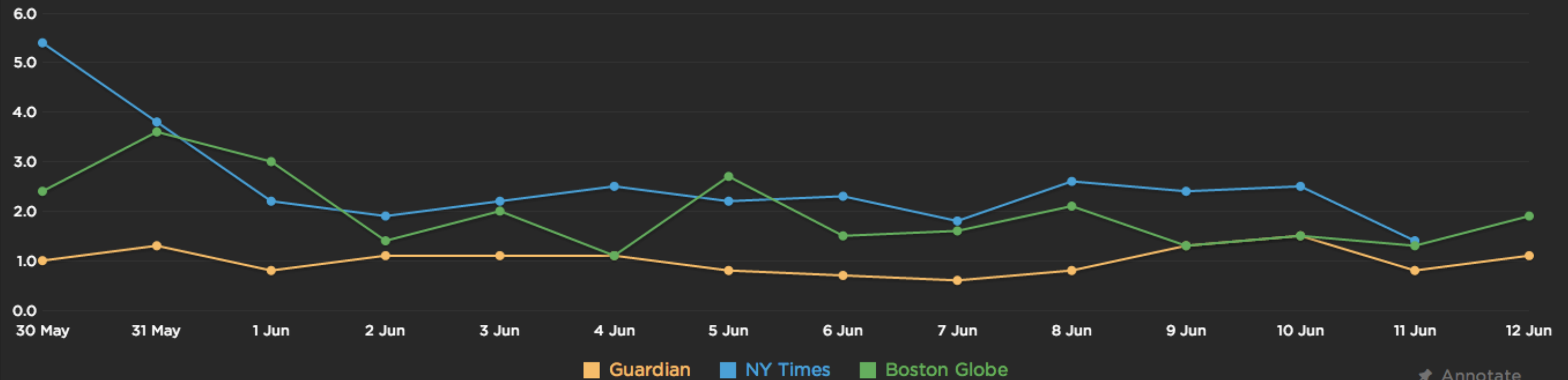
2.4s

Median over last 14 days. Average was 2.7s.

Boston Globe

1.6s

Median over last 14 days. Average was 1.8s.



★ Annotate

# SpeedCurve

<http://speedcurve.com>

Guardian

2002

Median over last 14 days. Average was 2012.7

NY Times

5132

Median over last 14 days. Average was 5339

Boston Globe

2074

Median over last 14 days. Average was 2280.1

SpeedCurve

<http://speedcurve.com>





# How to optimize

<http://www.flickr.com/photos/freefoto/2231356418/>



**Content-Encoding:** gzip

**Cache-Control:** max-age=315360000

Web performance 101

<http://www.flickr.com/photos/freefoto/2231356418/>

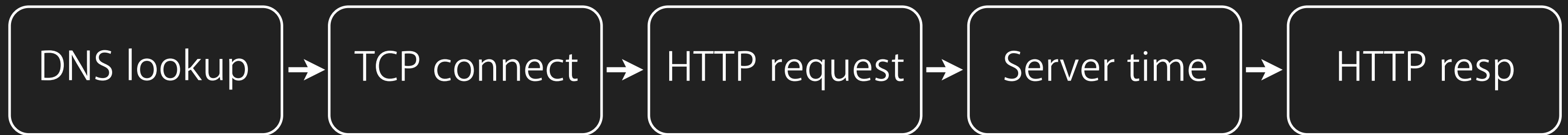


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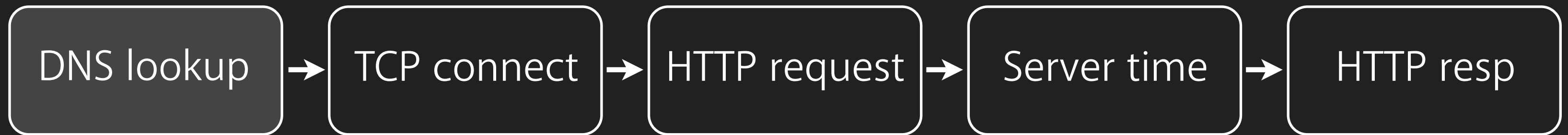
Optimizing: **First byte**

<http://www.flickr.com/photos/freefoto/2231356418/>

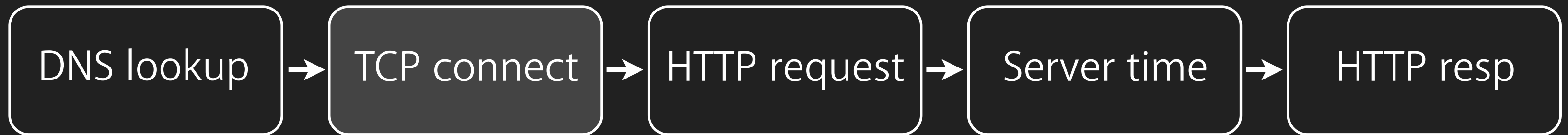
# Optimizing: **First byte**



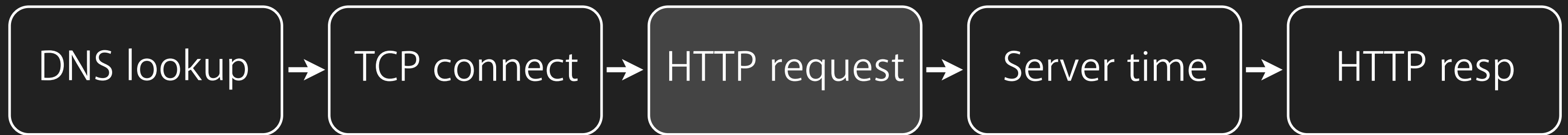
# Optimizing: **First byte**



# Optimizing: **First byte**



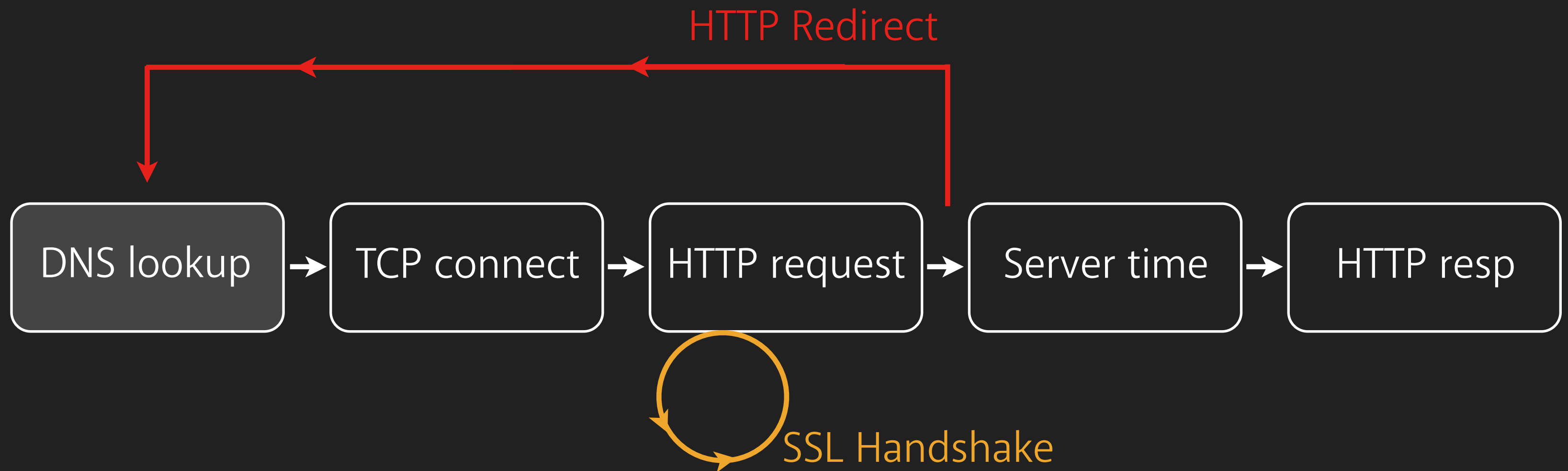
# Optimizing: **First byte**



# Optimizing: **First byte**

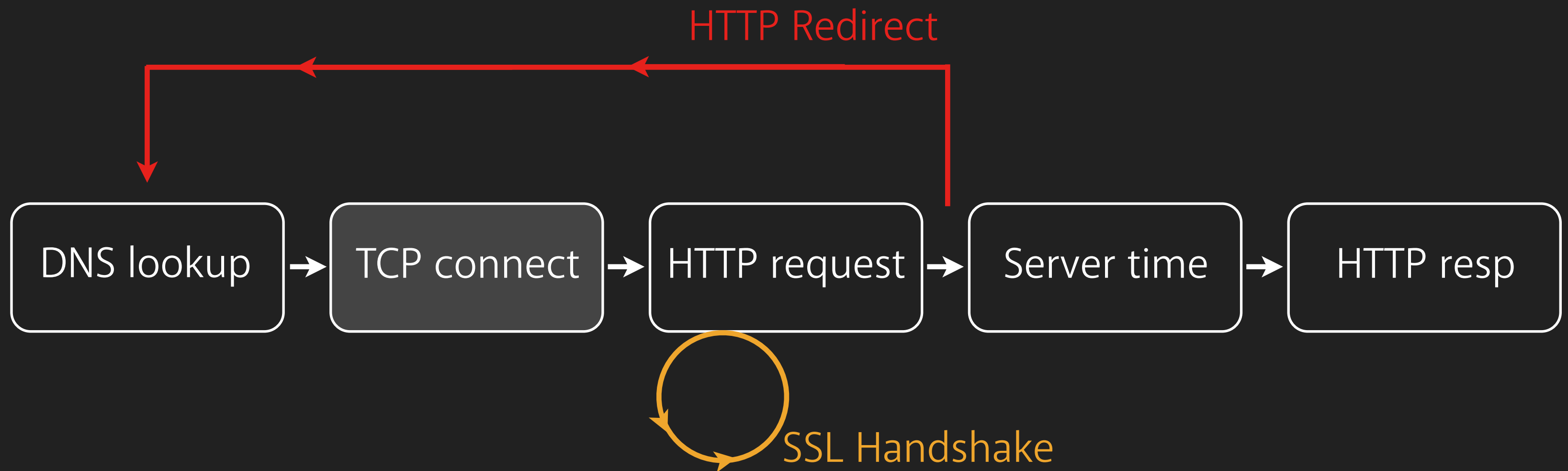


# Optimizing: **First byte**

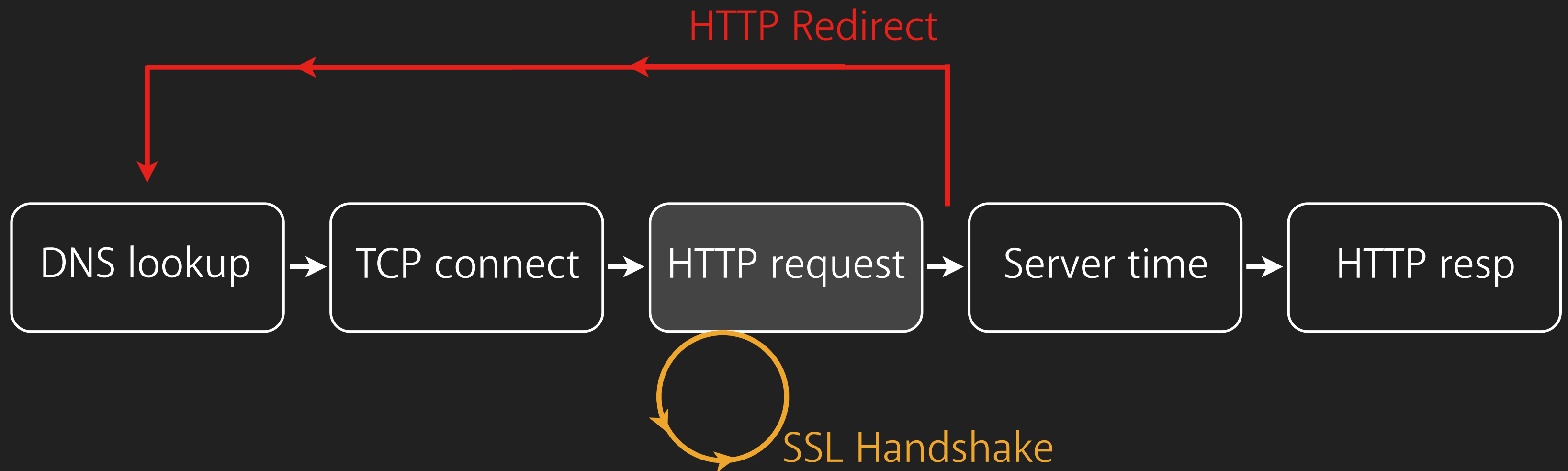




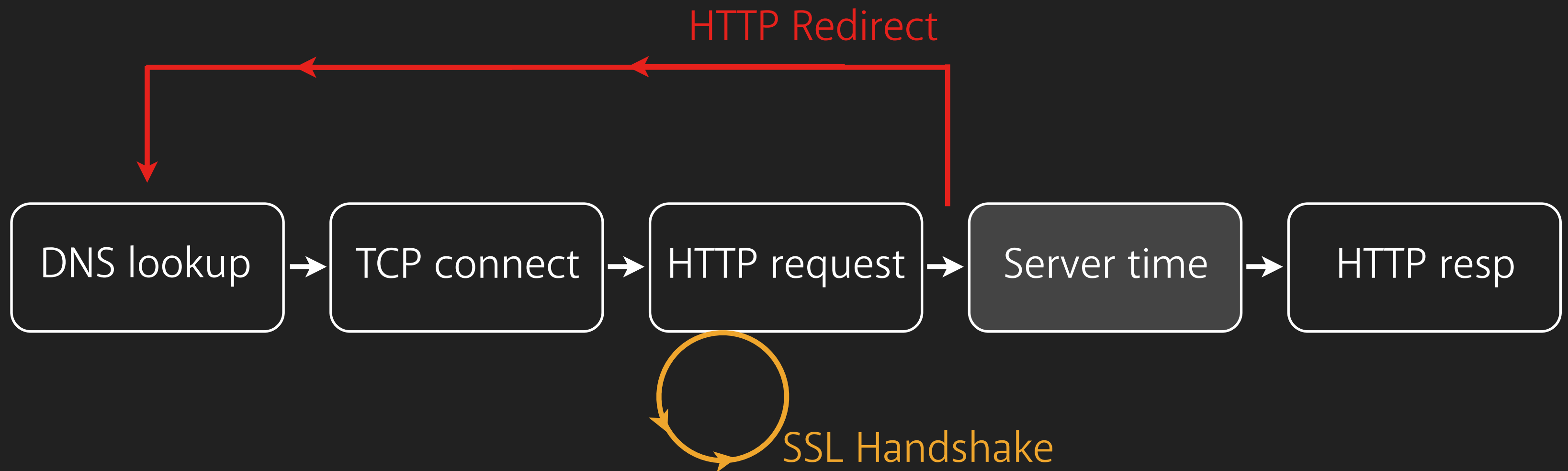
# Optimizing: **First byte**



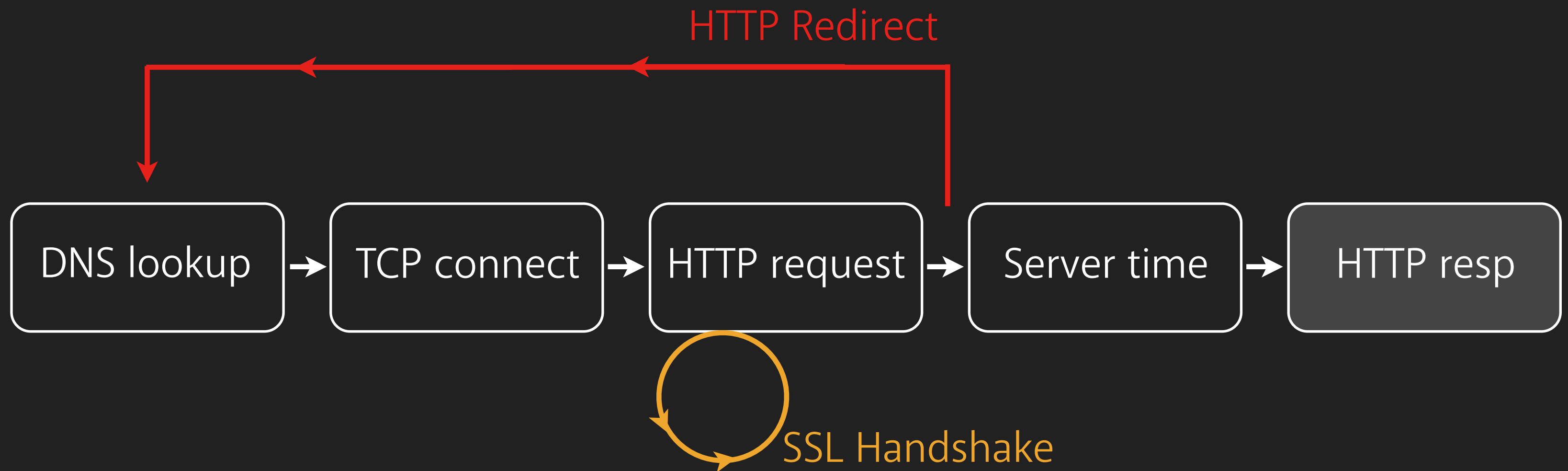
# Optimizing: **First byte**



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# Optimizing: **First byte**

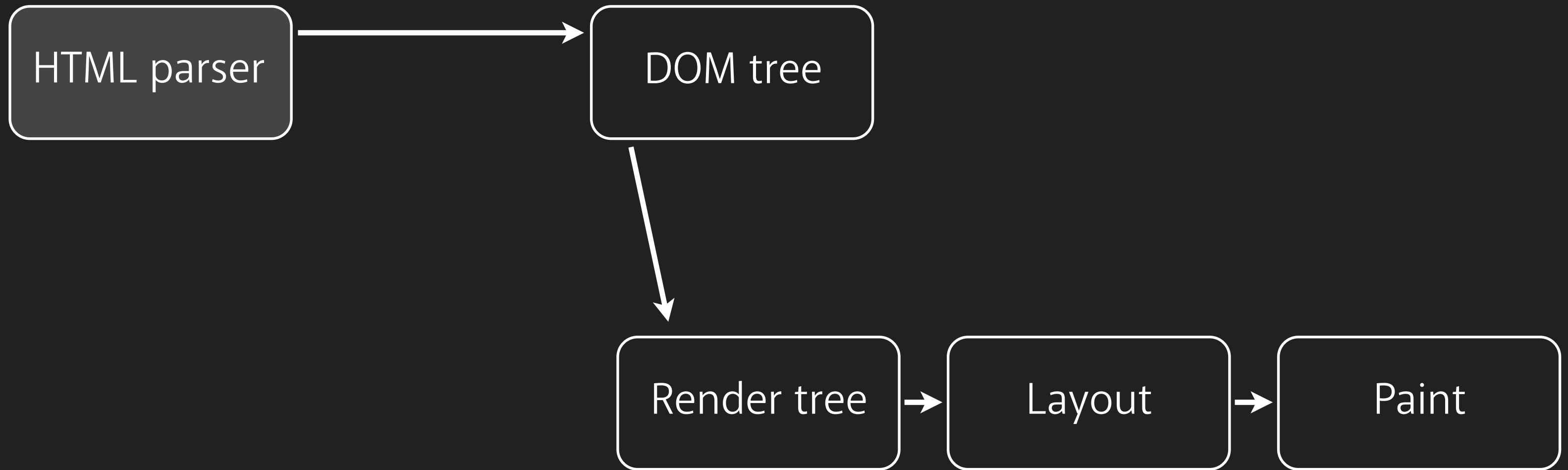
- Eliminate redirects
- Just eliminate redirects
- Flush the document early?
- Prefetch DNS?
- But really, just eliminate redirects

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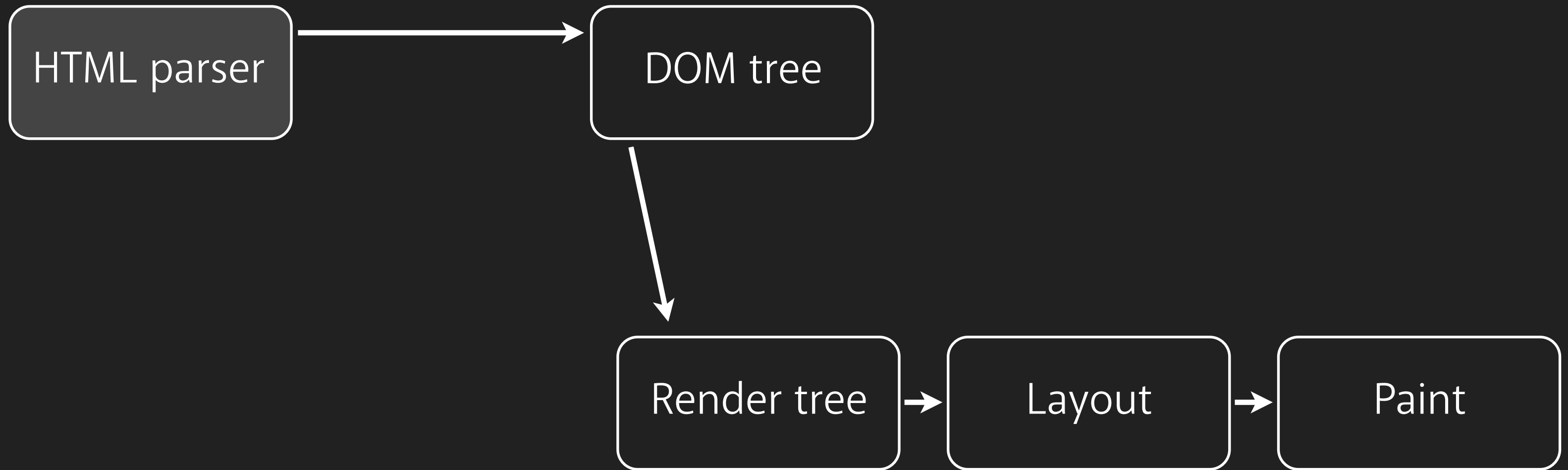
<http://www.flickr.com/photos/freefoto/2231356418/>

# Optimizing: **Start render**

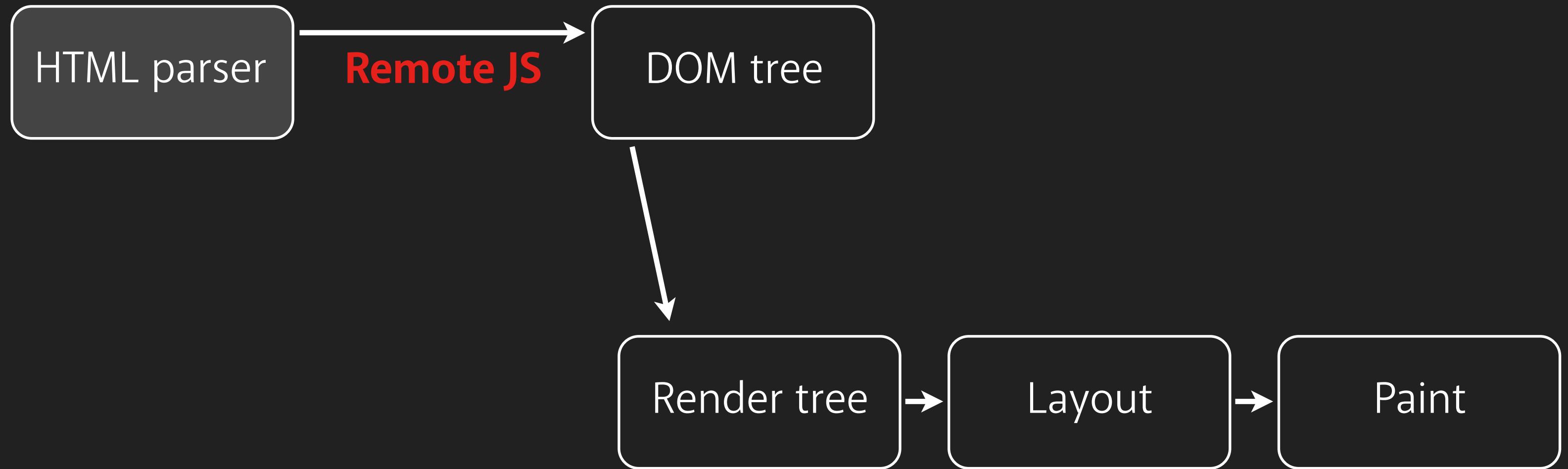




# Optimizing: **Start render**

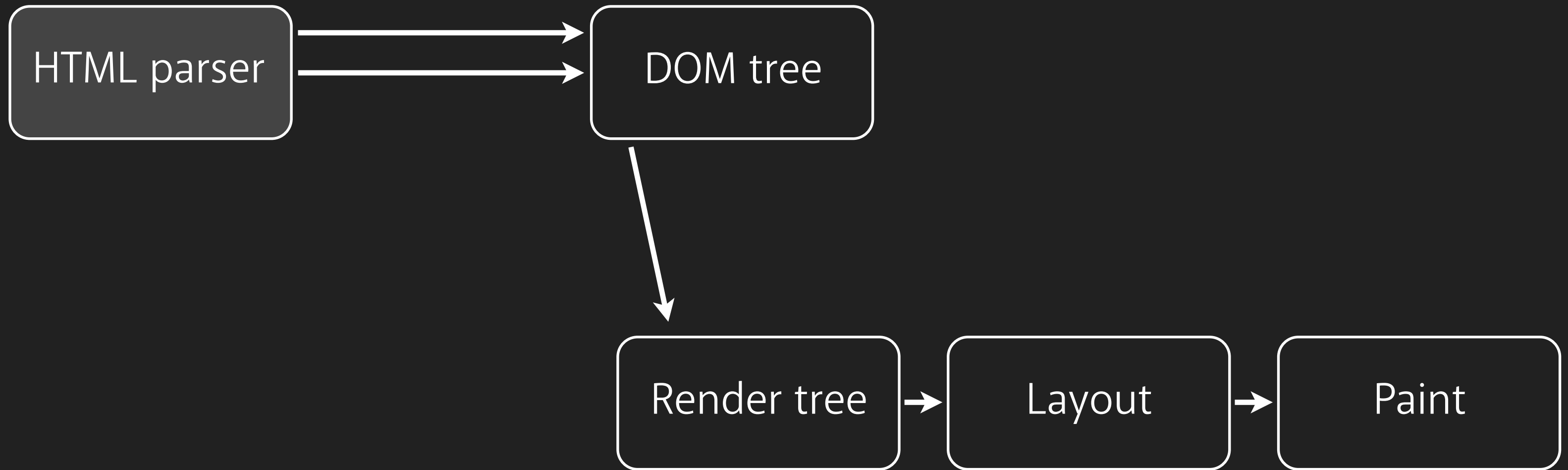


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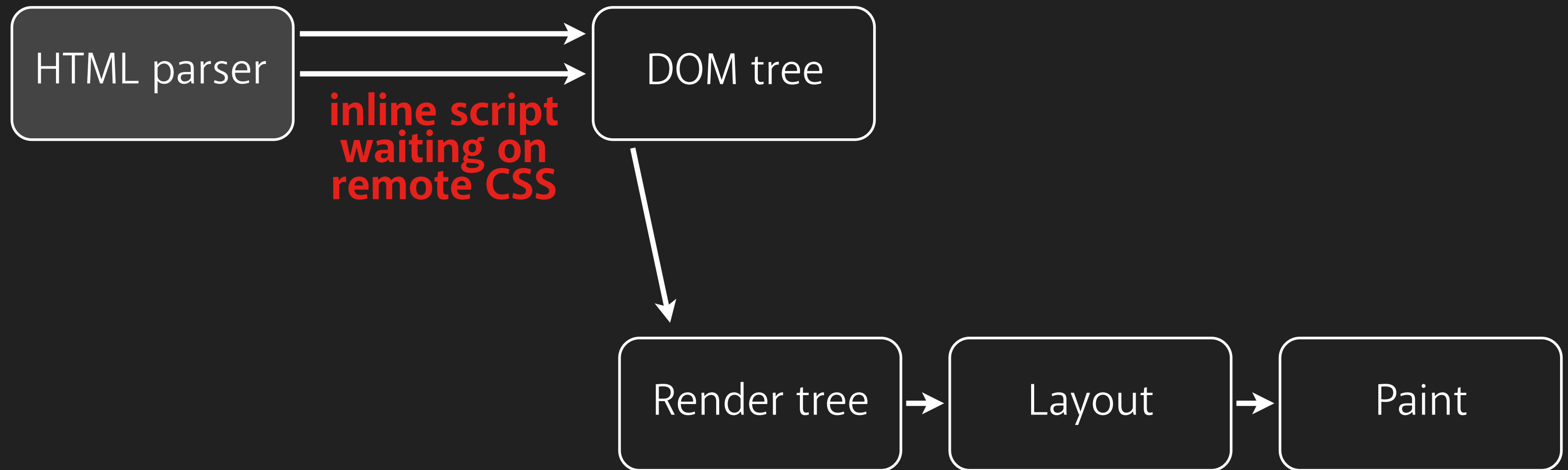




# Optimizing: **Start render**

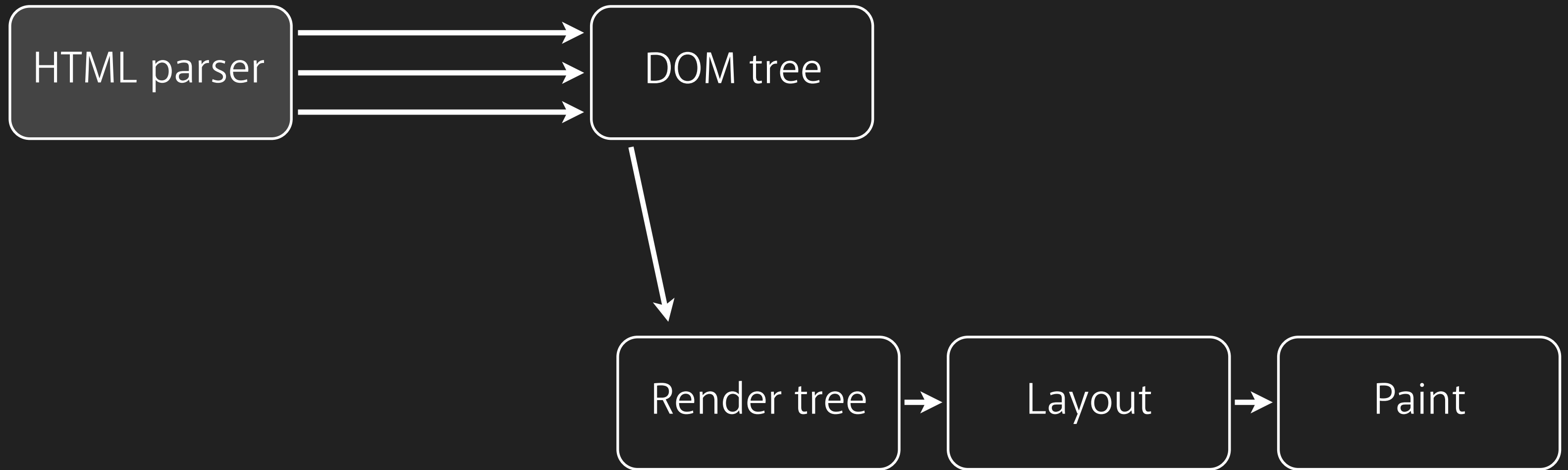


# Optimizing: **Start render**

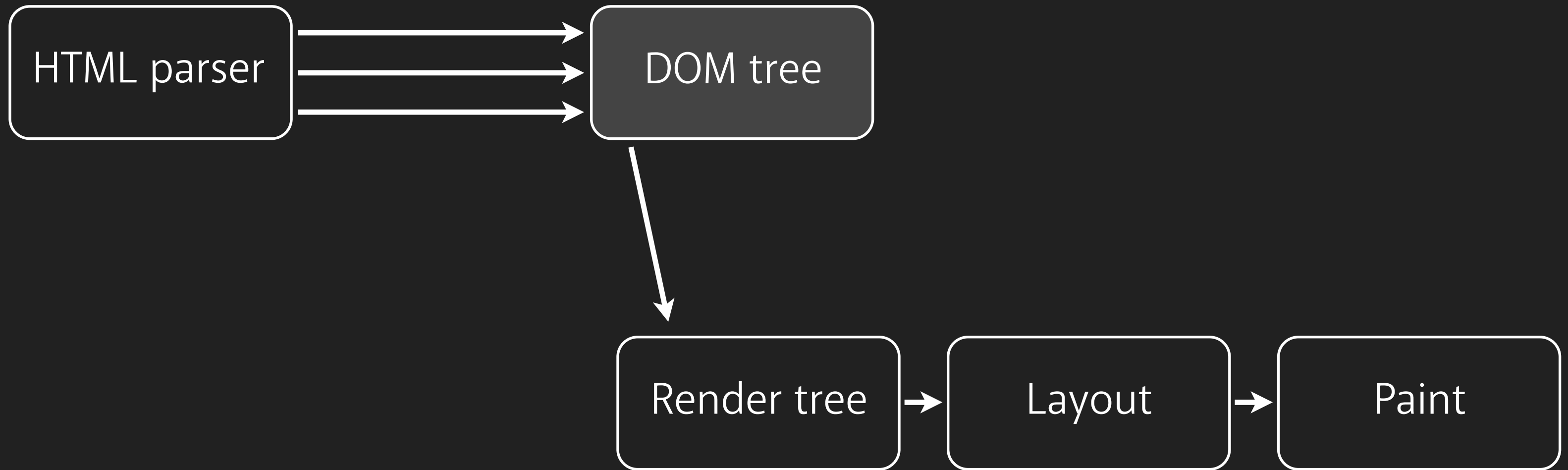




# Optimizing: **Start render**

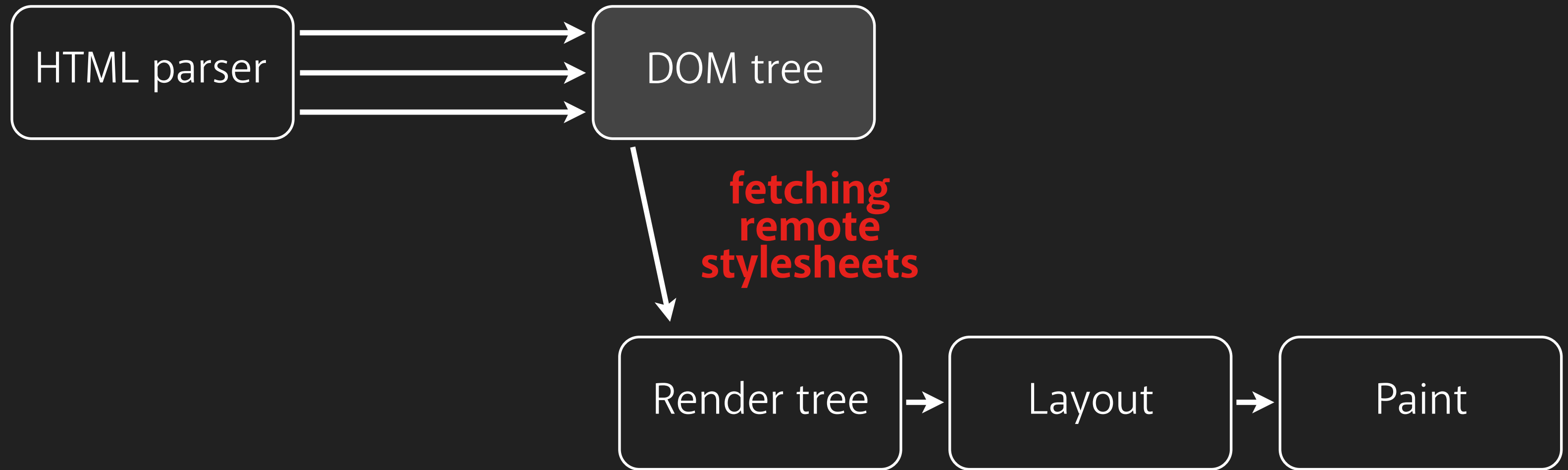


# Optimizing: **Start render**

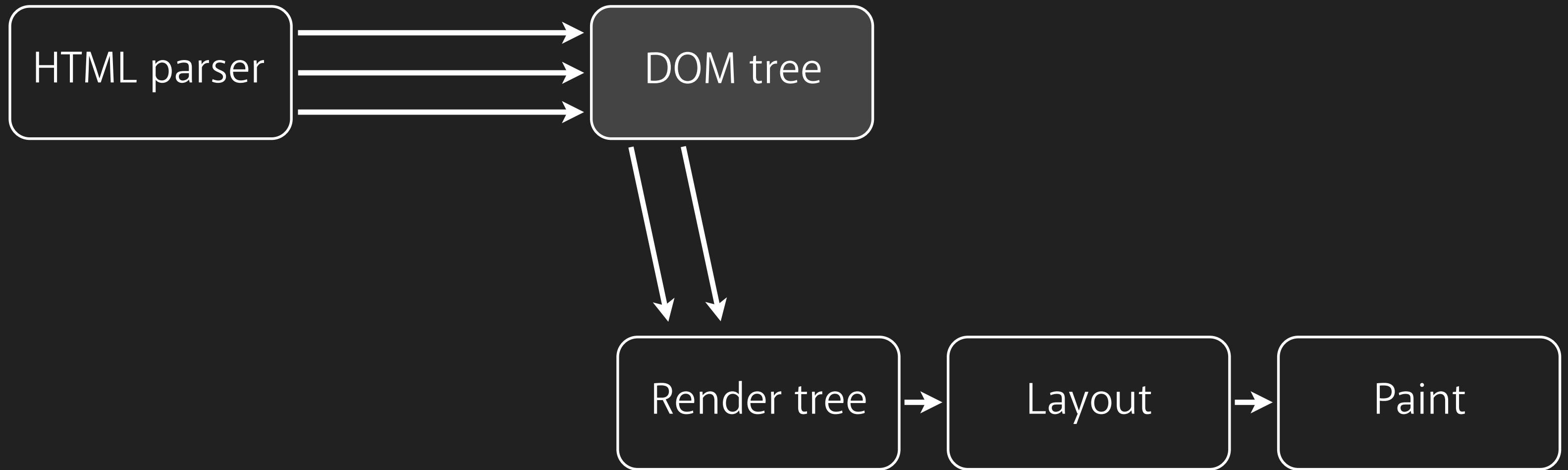




# Optimizing: **Start render**

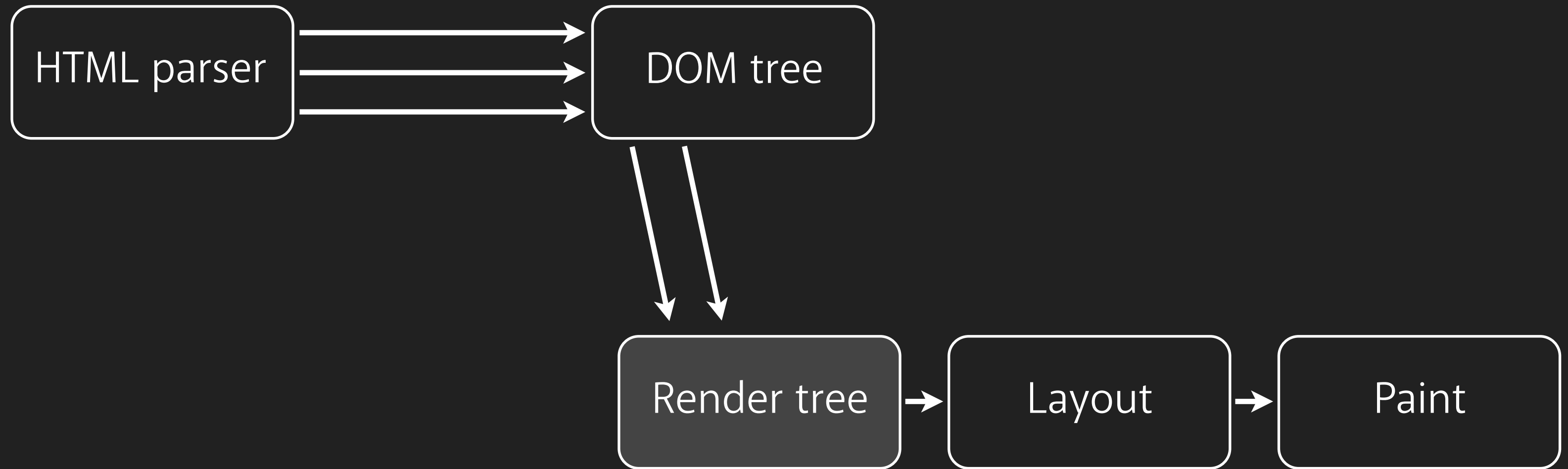


# Optimizing: **Start render**

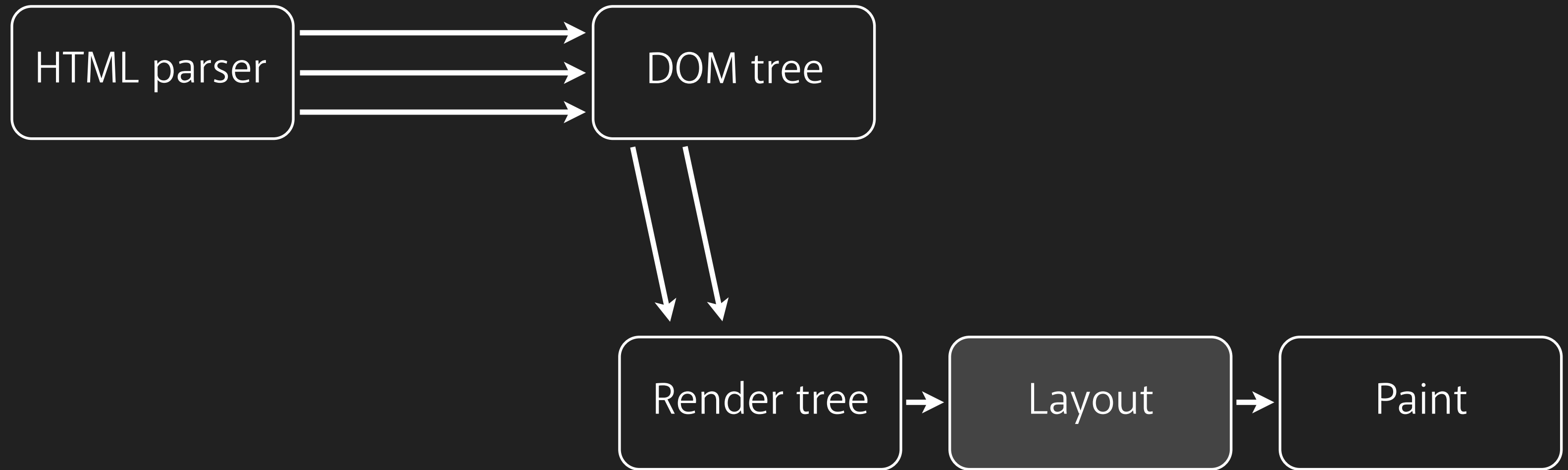




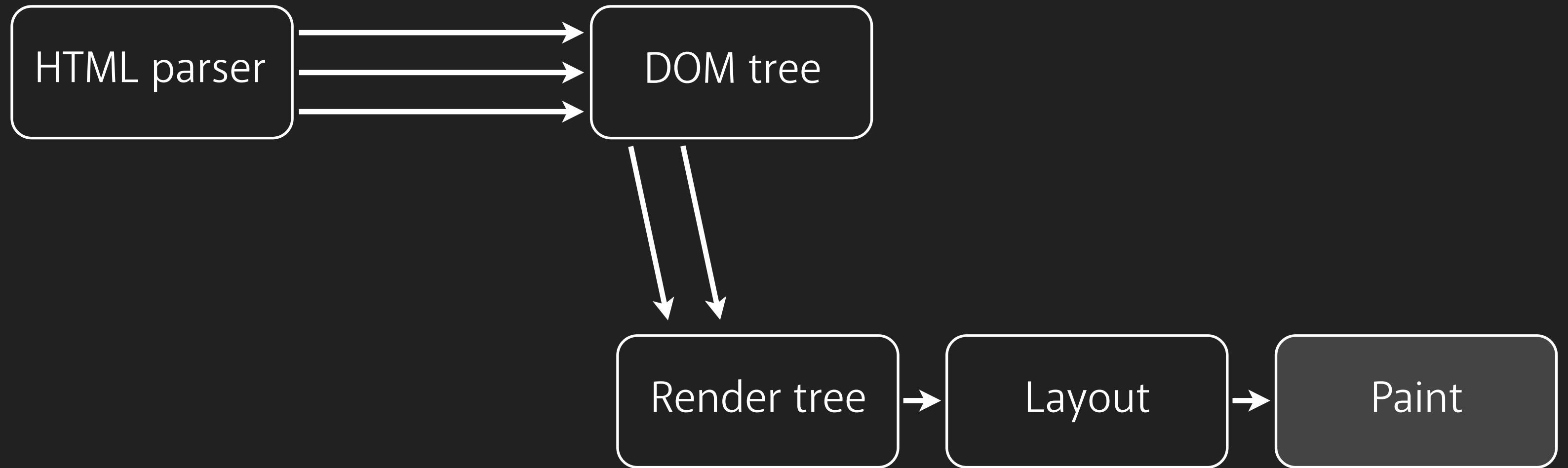
# Optimizing: **Start render**



# Optimizing: **Start render**



# Optimizing: **Start render**





# Optimizing: **Start render**

- Avoid blocking scripts

# Optimizing: **Start render**

```
<script>
```

```
var script = document.createElement('script');  
script.src = "app.js";  
document.head.appendChild(script);
```

```
</script>
```

# Optimizing: **Start render**

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var script = document.createElement('script');
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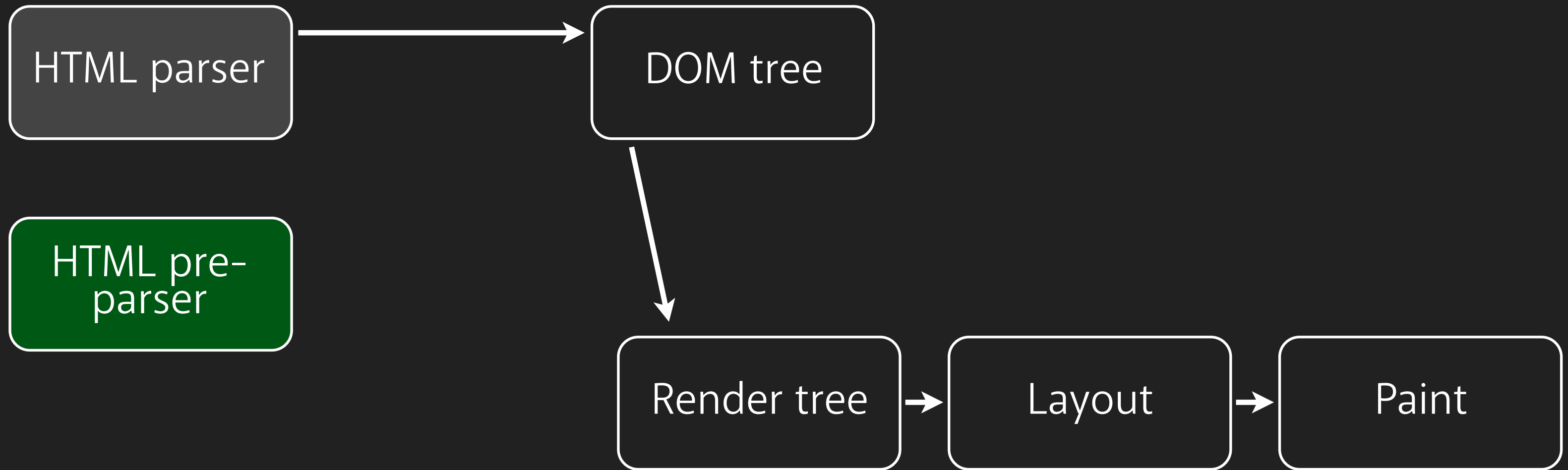
```
document.head.appendChild(script);
```

```
</script>
```

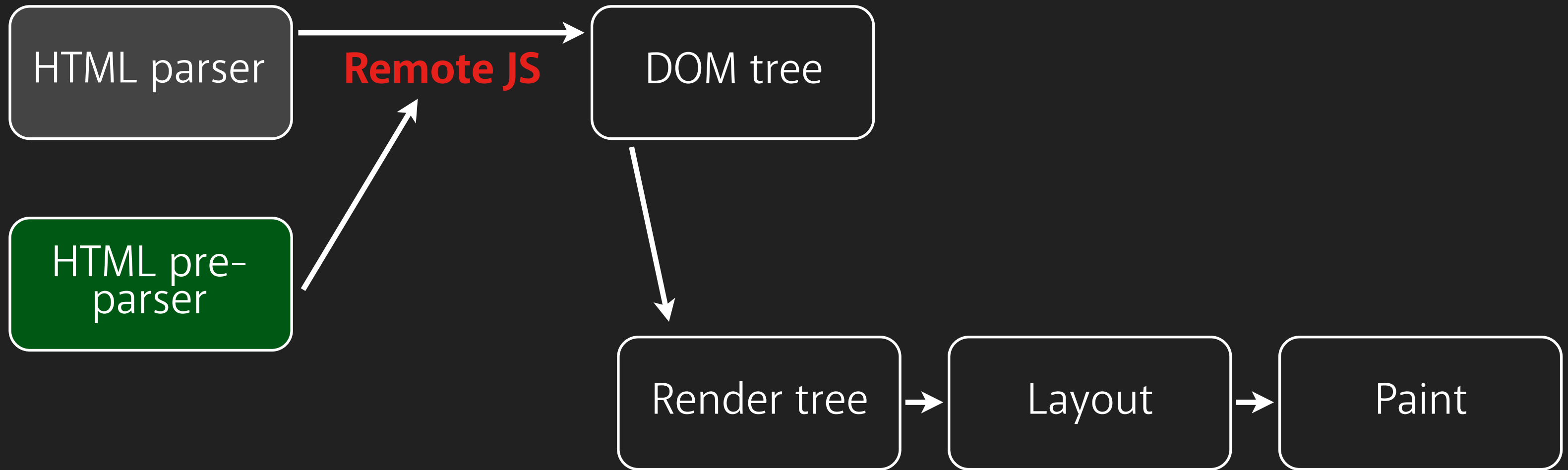
# **BREAKS THE PRE-PARSER!**



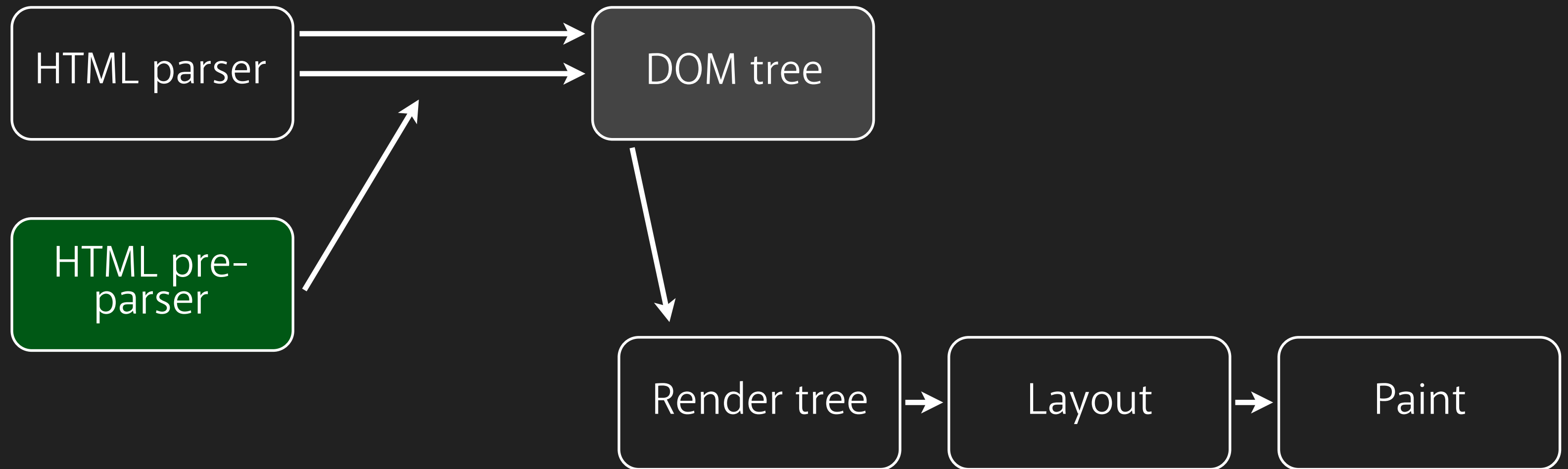
# Optimizing: **Start render**



# Optimizing: **Start render**

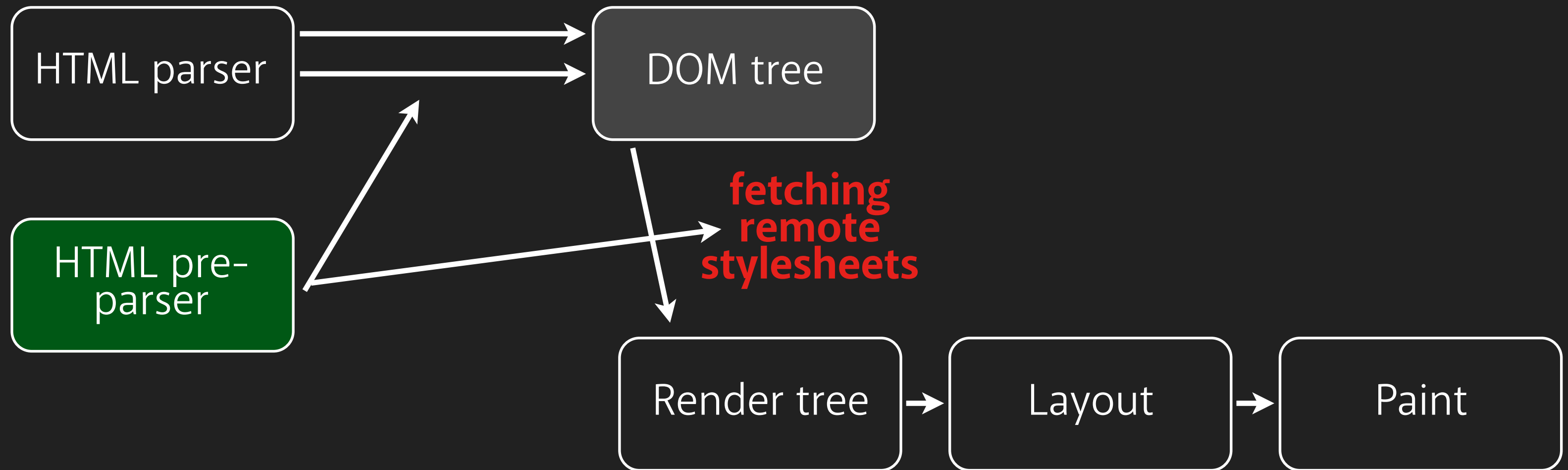


# Optimizing: **Start render**

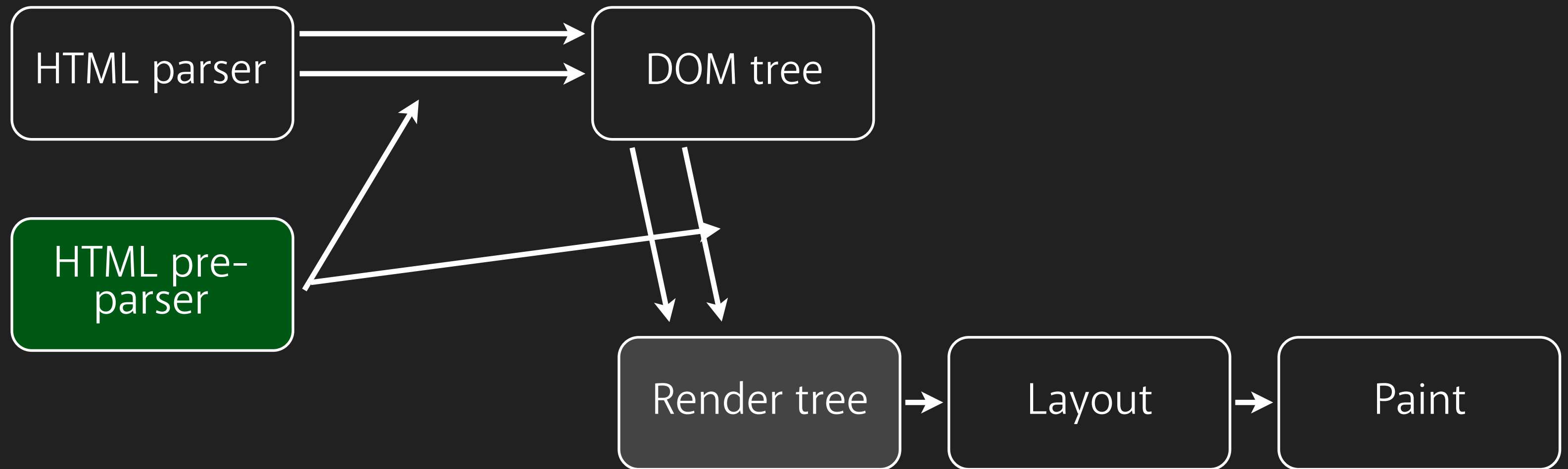




# Optimizing: **Start render**



# Optimizing: **Start render**



# Optimizing: **Start render**

```
<script>
```

```
var script = document.createElement('script');
```

```
script.src = "app.js";
```

```
document.head.appendChild(script);
```

```
</script>
```

# BREAKS THE PRE-PARSER!



# Optimizing: **Start render**

```
<script src="app.js" async defer></script>
```

# Optimizing: **Start render**

- Avoid blocking scripts
  - Move script elements to end of **<body>**
  - Or... add **async** attribute to script elements
- Inline critical CSS

# Optimizing: **Start render**

- Avoid blocking scripts
  - Move script elements to end of **<body>**
  - Or... add **async** attribute to script elements
- Inline critical CSS
  - <https://github.com/pocketjoso/penthouse>

	Load Time	First Byte	Start Render	Fully Loaded	Speed Index
FIRST VIEW	3.783s	0.128s	0.676s	6.530s	1522
REPEAT VIEW	2.268s	0.486s	0.486s	3.617s	980

Optimizing: **Load time & fully loaded**

<http://www.flickr.com/photos/freefoto/2231356418/>



# Optimizing: **Load time & fully loaded**

- gzip compression (of course!)
- Far-future caching (of course!)
- Concatenate files (of course!)

	Load Time	First Byte	Start Render	Fully Loaded	Speed Index
FIRST VIEW	3.783s	0.128s	0.676s	6.530s	1522
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# Optimizing: **Speed Index**

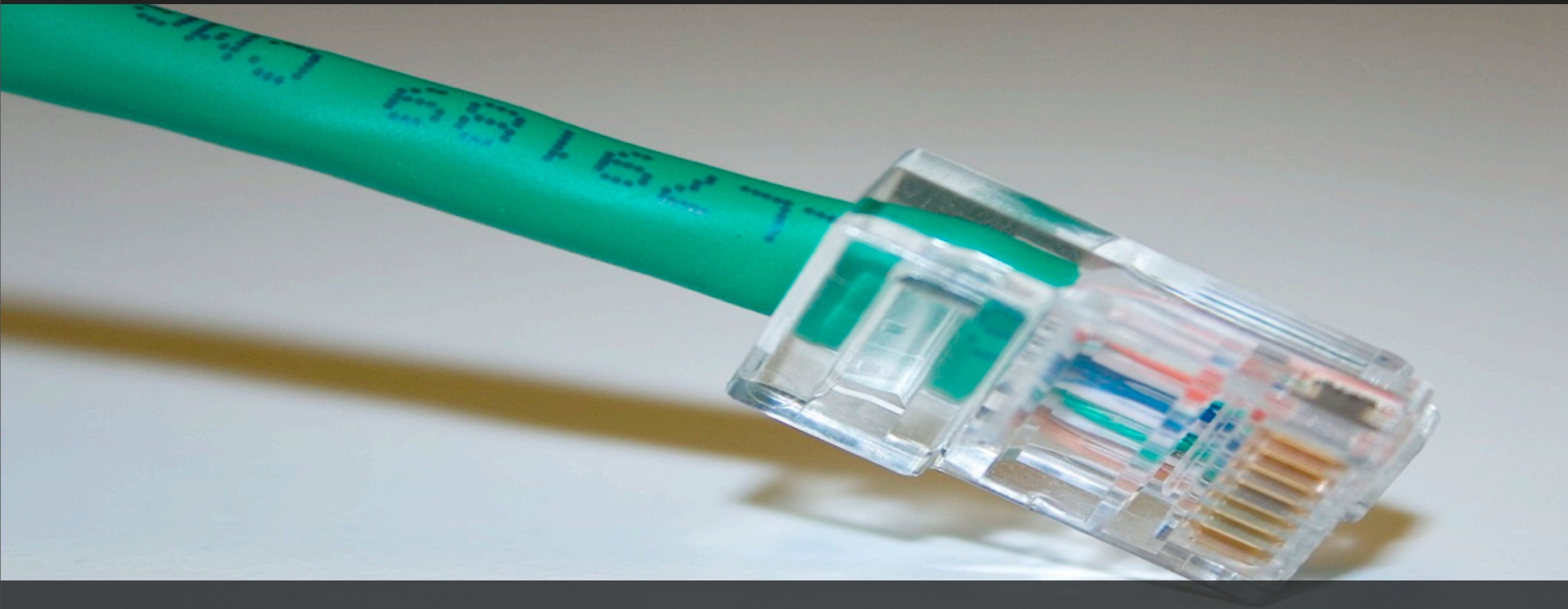
<http://www.flickr.com/photos/freefoto/2231356418/>



# Resilience

<http://www.flickr.com/photos/vpickering/6824364286/>





# Unreliable

[http://www.flickr.com/photos/the\\_jorr/325224175/](http://www.flickr.com/photos/the_jorr/325224175/)





# Progressive enhancement

<http://www.flickr.com/photos/8040811@N06/3167877765>





# The future

<http://www.flickr.com/photos/kayaker1204/4319542459/>

# Future: **HTTP/2 & SPDY**

# Future: **HTTP/2** & **SPDY**

- Multiplexing
- Cache pushing



# Future: **ServiceWorker**

# Future: **ServiceWorker**

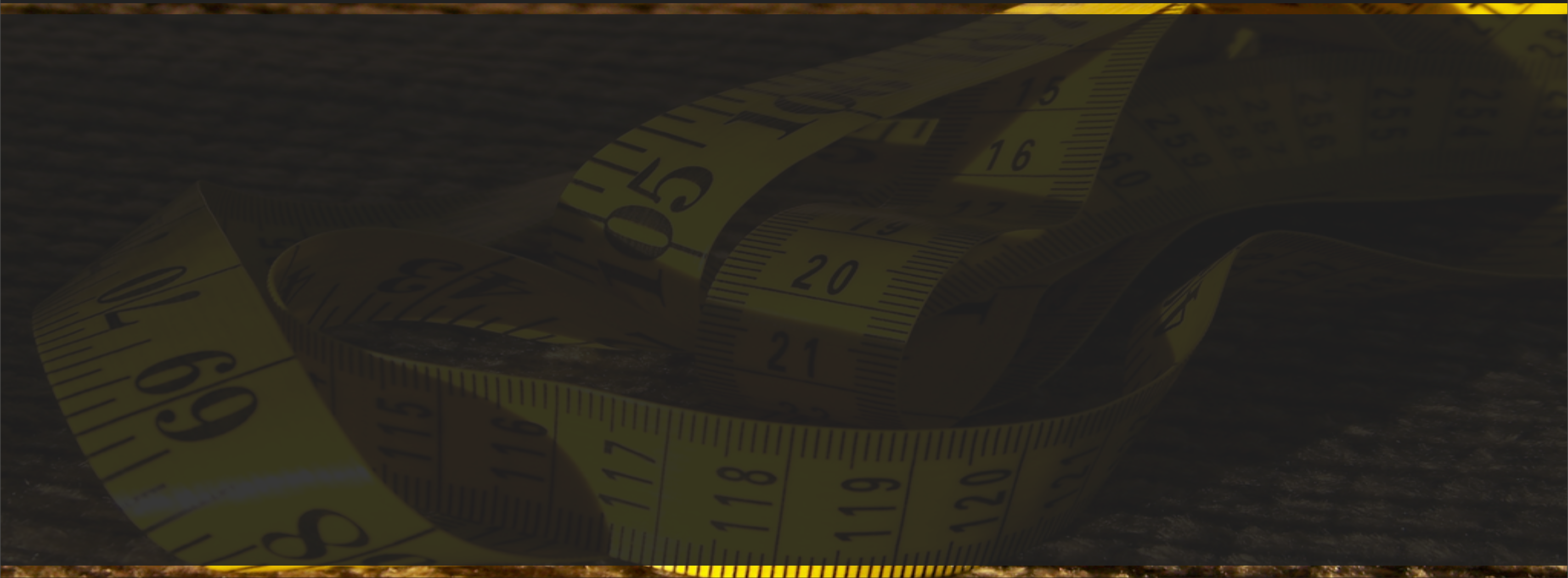
```
this.addEventListener('fetch', function (e) {  
  if (e.request.url.host === 'guardian.co.uk') {  
    e.forwardTo('http://theguardian.com');  
  }  
})
```

(Possibly not possible)

# Future: **ServiceWorker**

```
this.addEventListener('fetch', function (e) {  
  if (window.innerWidth > 500) {  
    e.forwardTo(e.request.url + '?width=large');  
  }  
})
```


(Possibly not possible)



# Experiment and measure

<http://www.flickr.com/photos/kayaker1204/4319542459/>



- 
- Theorize
  - Experiment, and...
  - Measure

# Experiment and measure

<http://www.flickr.com/photos/kayaker1204/4319542459/>

# Thank-you!

 <http://lanyrd.com/sdbmhb>

 @andyhume

