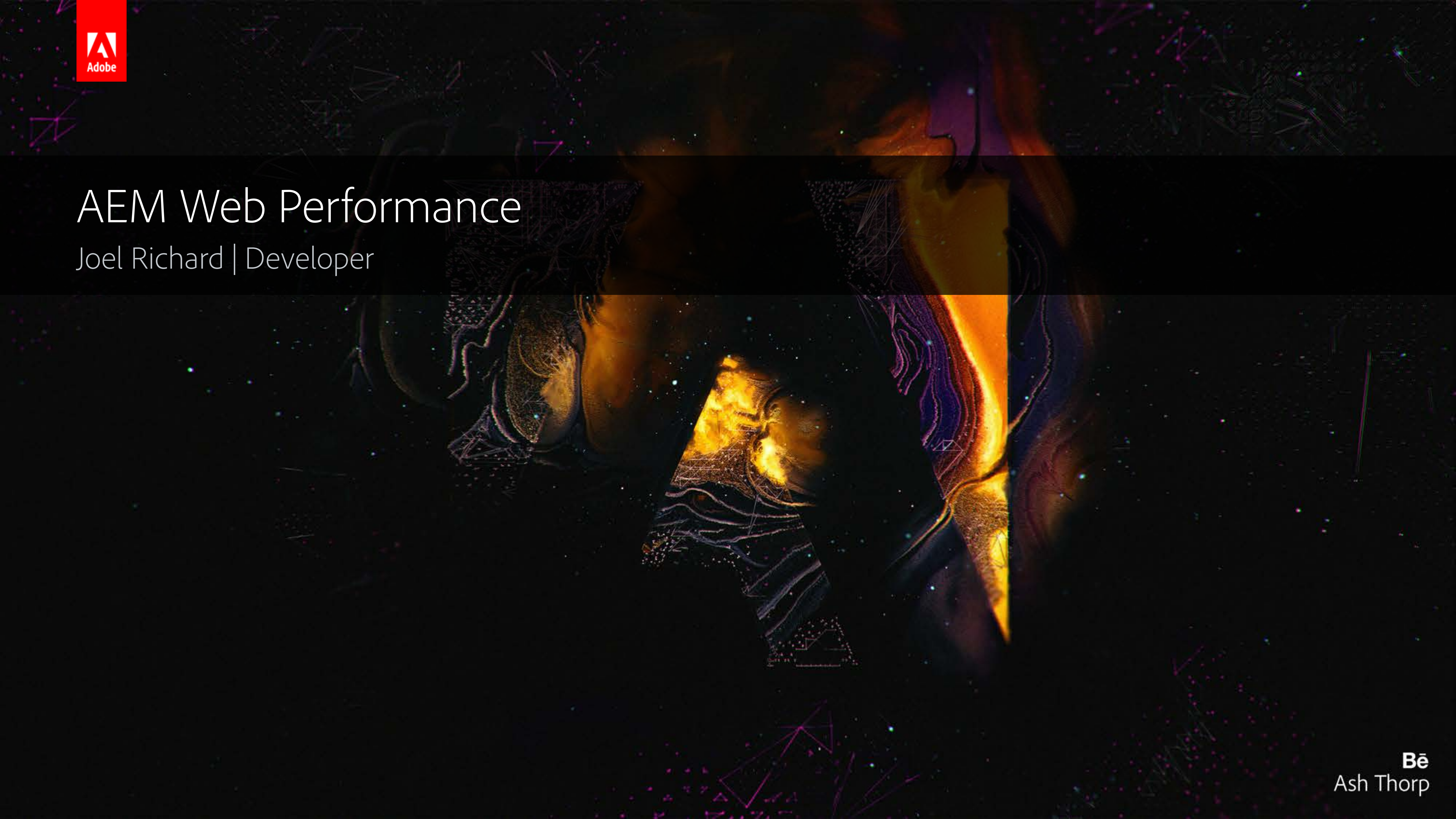
AEM Web Performance

Joel Richard | Developer



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  - Profiling
  - Minimizing reflows

- Server
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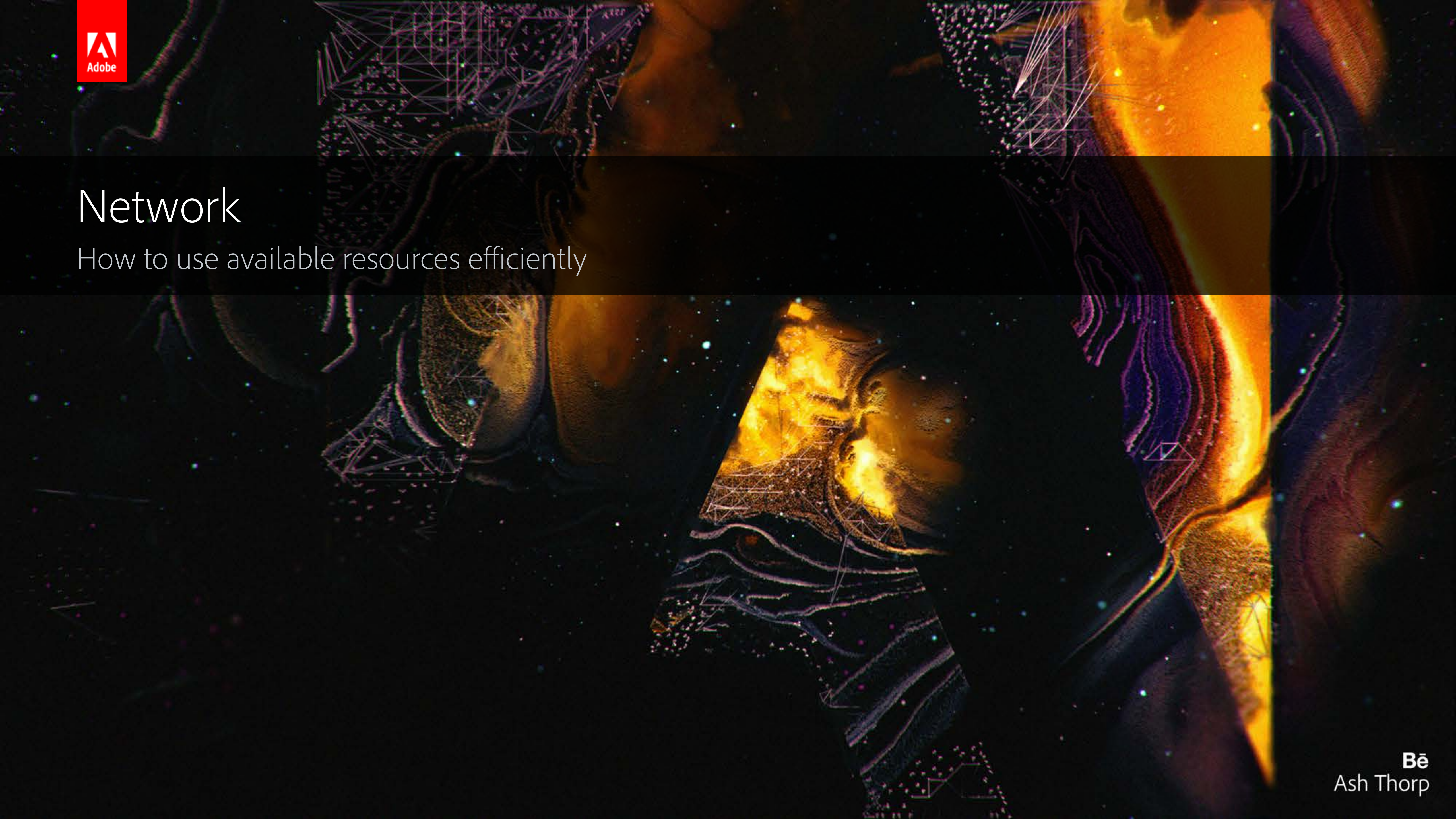
  - Built-in tools
  - Profiling

Network

How to use available resources efficiently



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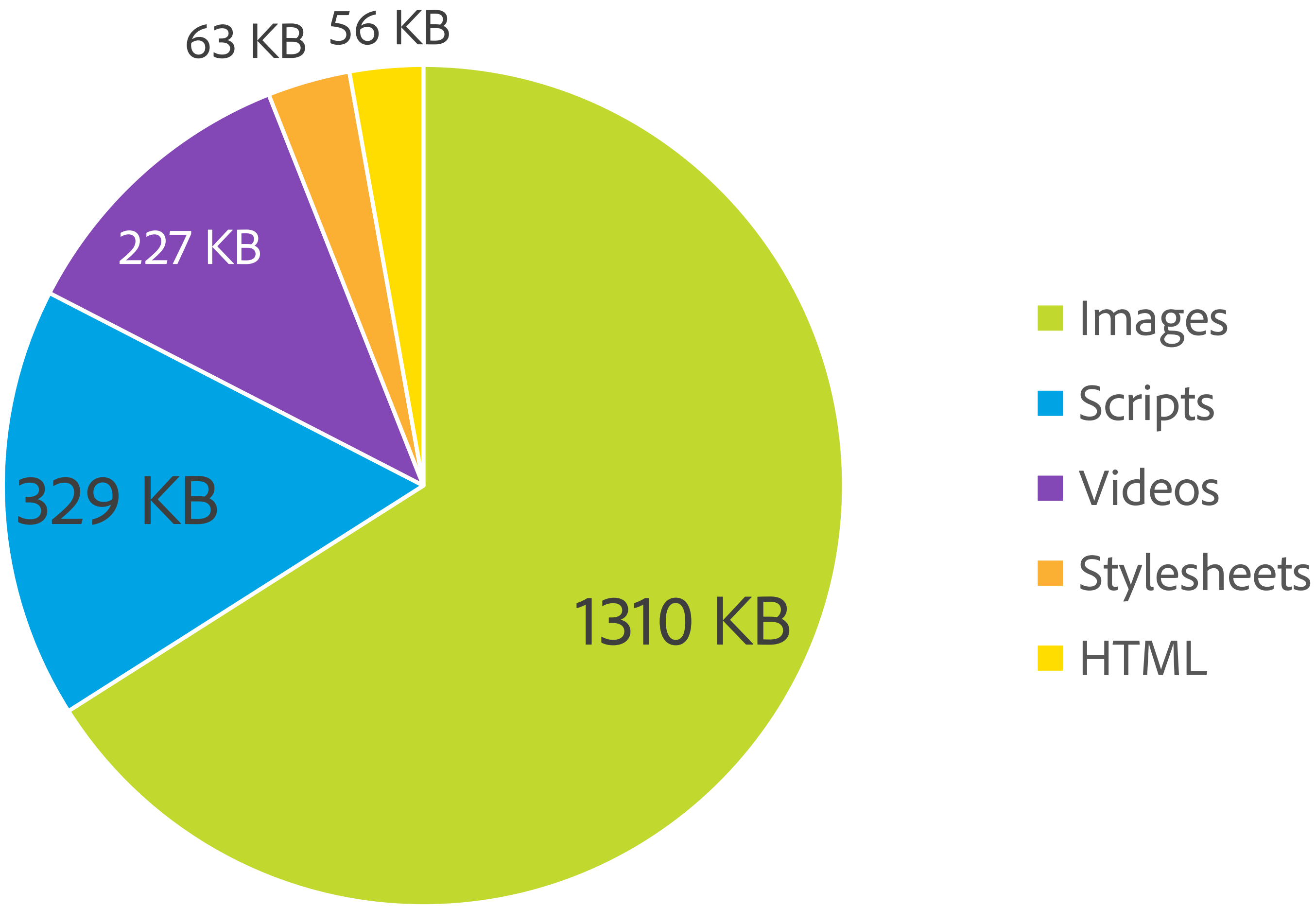
Basic Optimizations

- Dispatcher caching

- Keep-Alive
  - Apache: KeepAlive On *(default)*
- Gzipping
  - Apache: AddOutputFilterByType DEFLATE

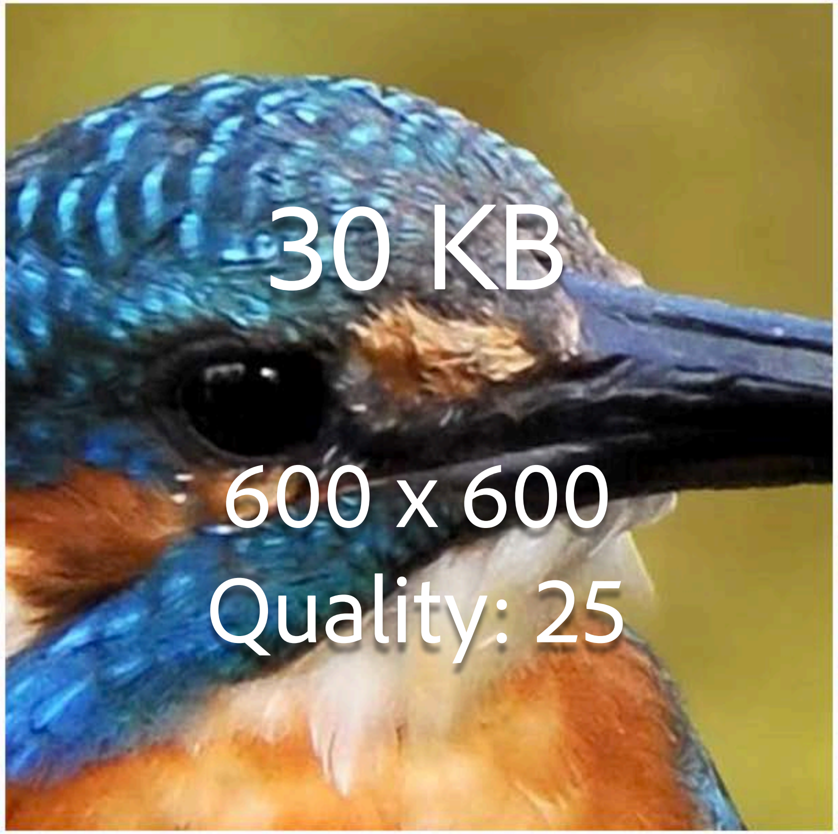
- HTTP caching
  - Apache: ExpiresDefault, ExpiresByType

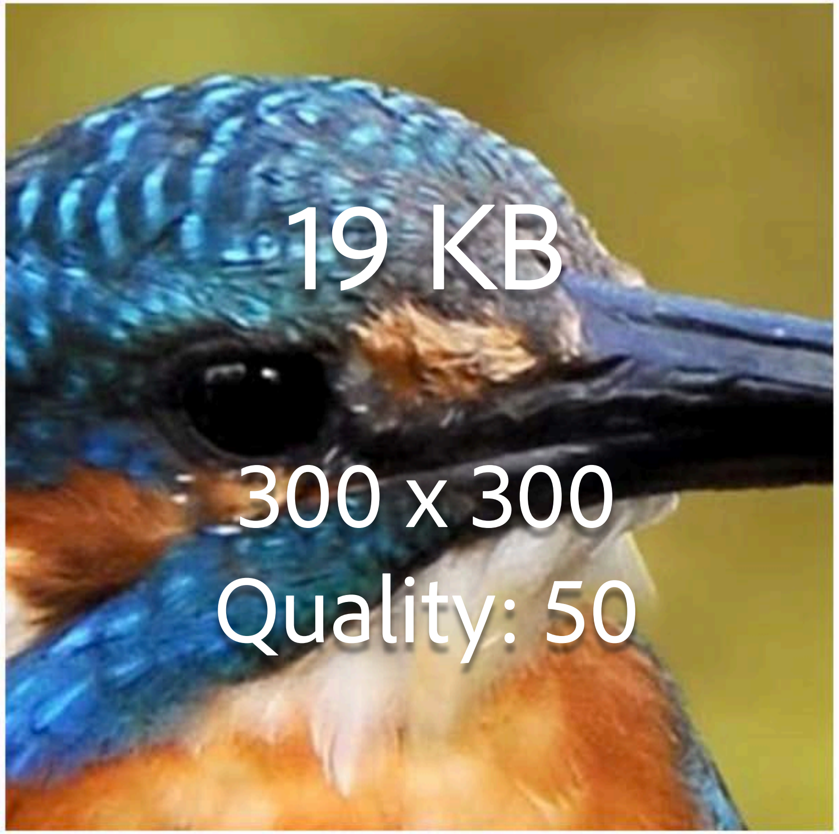
Average Payload 2015: 2.1 MB (Soasta)



Shrink Payload: High-DPI Images

- Low quality is (often) better than low resolution:





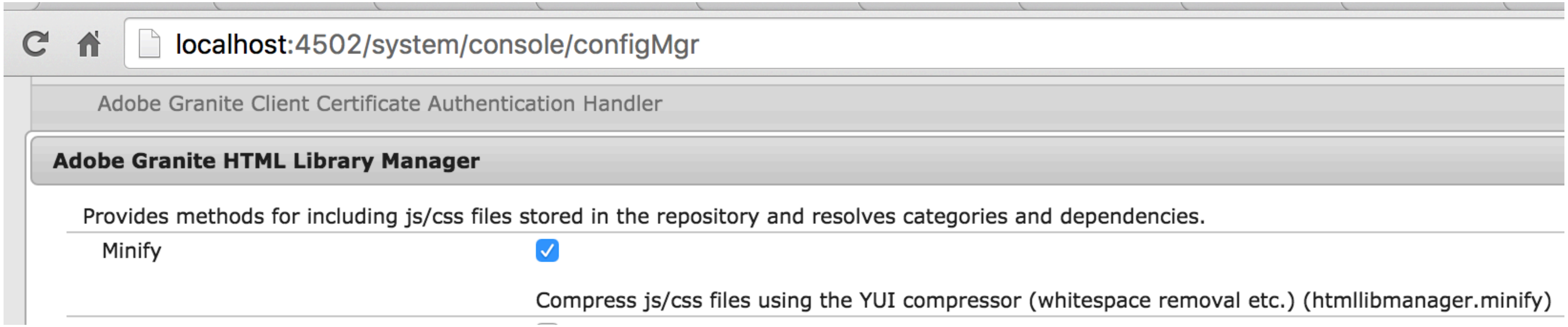
Shrink Payload: Image Components & Servlets

- AEM Core WCM Components: Image Component (GitHub)
  - Responsive & smart loading

- ACS AEM Commons: Named Transform Image Servlet
  - Image transformation

- Alternatives:
  - Adaptive Image Component
    - Responsive
  - Abstract Image Servlet
    - YourImageServlet extends com.day.cq.wcm.commons.AbstractImageServlet

Shrink Payload: Clientlib Minification



localhost:4502/system/console/configMgr

Adobe Granite Client Certificate Authentication Handler

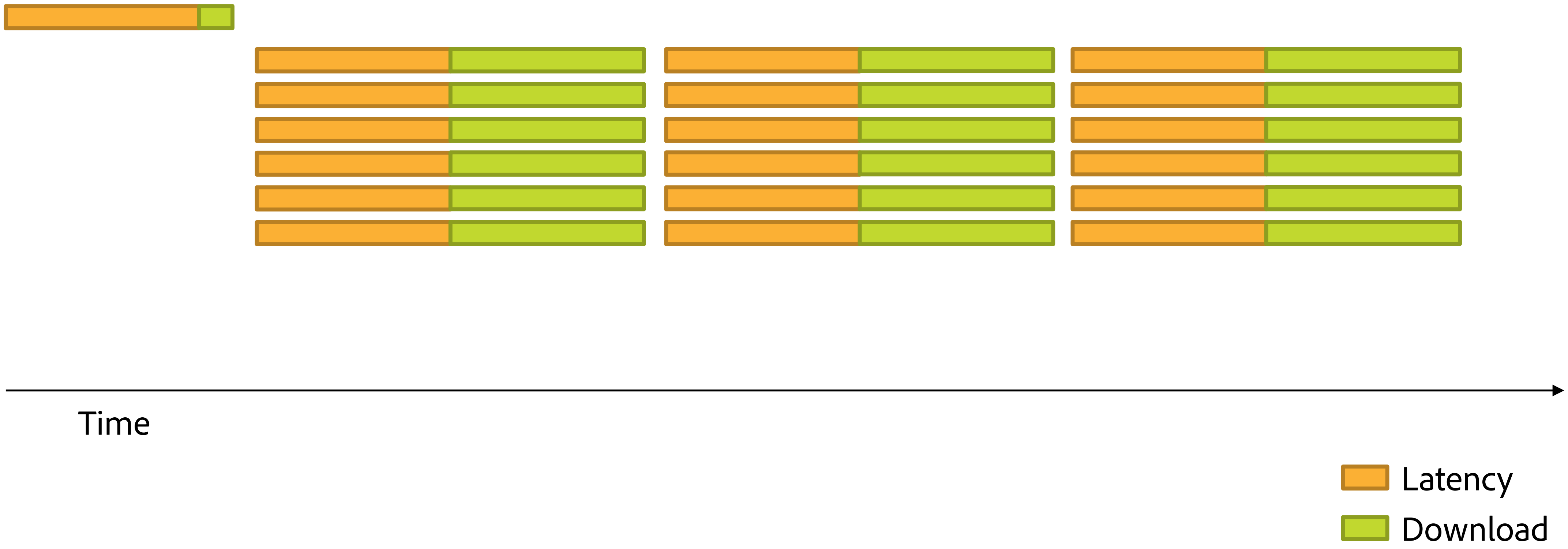
Adobe Granite HTML Library Manager

Provides methods for including js/css files stored in the repository and resolves categories and dependencies.

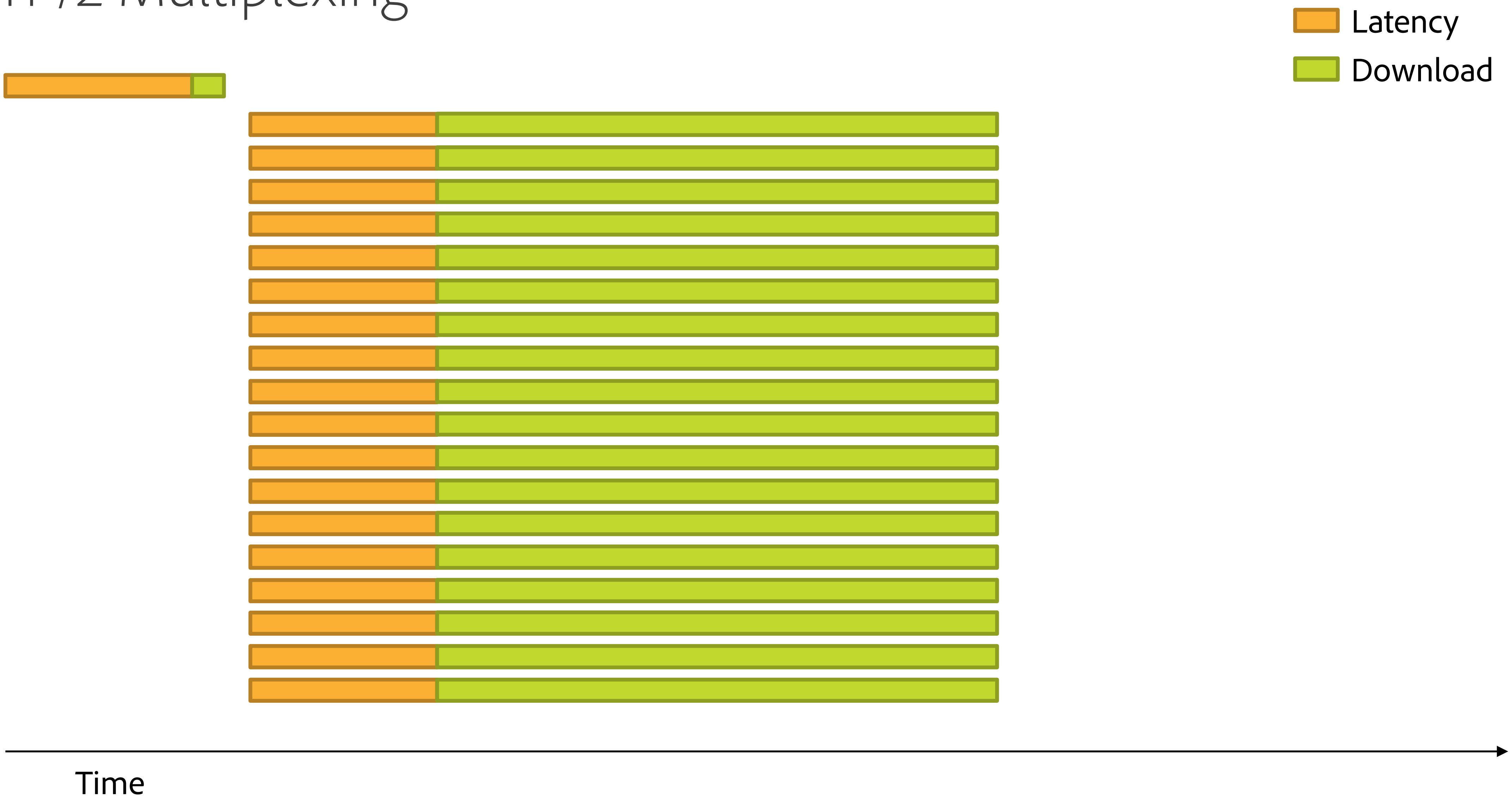
Minify ☑

Compress js/css files using the YUI compressor (whitespace removal etc.) (htmllibmanager.minify)

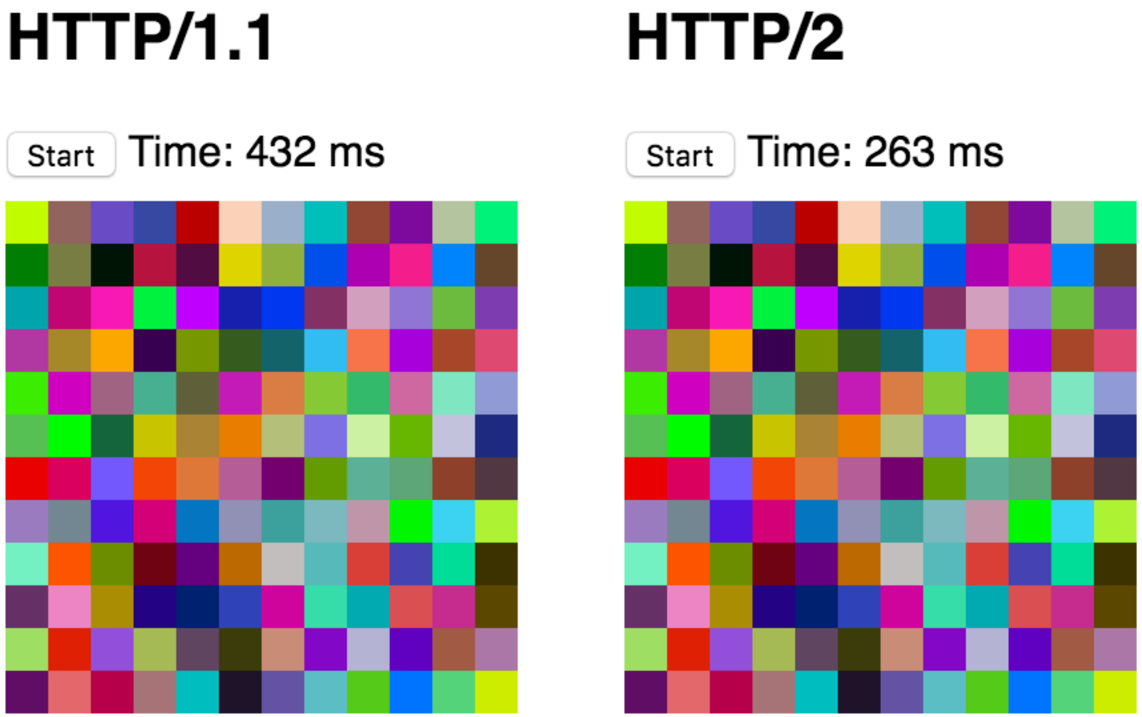
HTTP/1.1 Request Flow



HTTP/2 Multiplexing



HTTP/2 Technology Demo



HTTP/1.1

Time: 432 ms

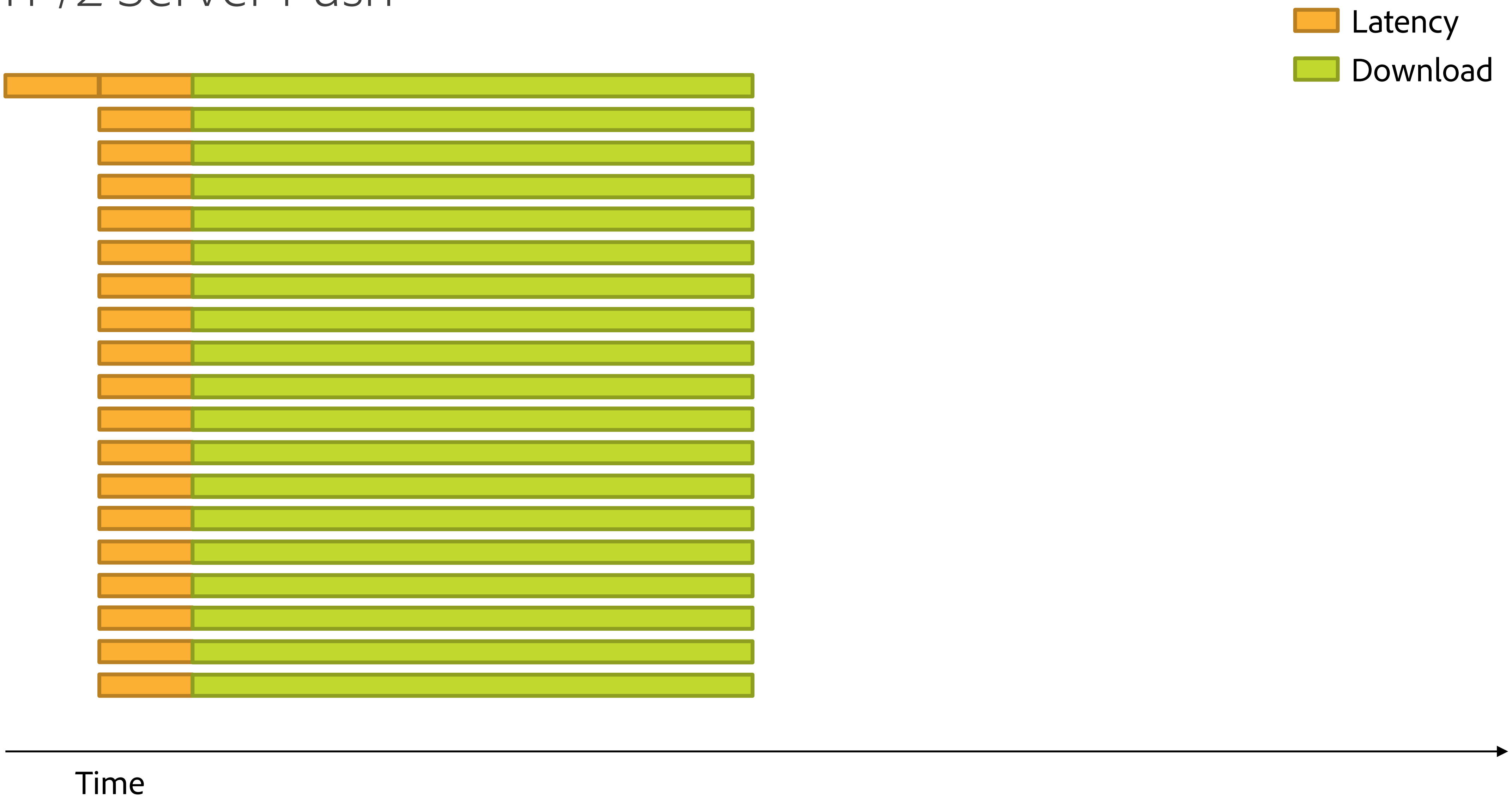
HTTP/2

Time: 263 ms

HTTP/2 with Apache

- Apache 2.4.17
- mod_http2
- SSL
- Dispatcher 4.2.0 (mid June)

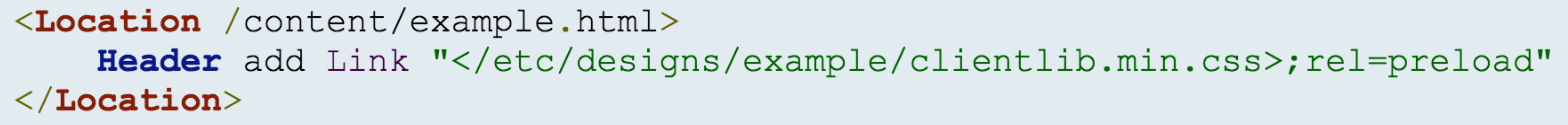
HTTP/2 Server Push



HTTP/2 Server Push with Apache

- Directive: H2Push on *(default)*

- Example Configuration:

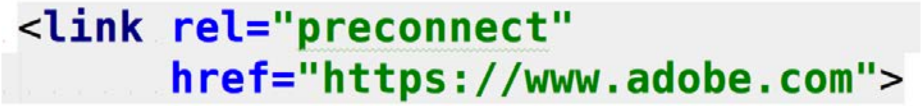


```
<Location /content/example.html>
    Header add Link "</etc/designs/example/clientlib.min.css>;rel=preload"
</Location>
```

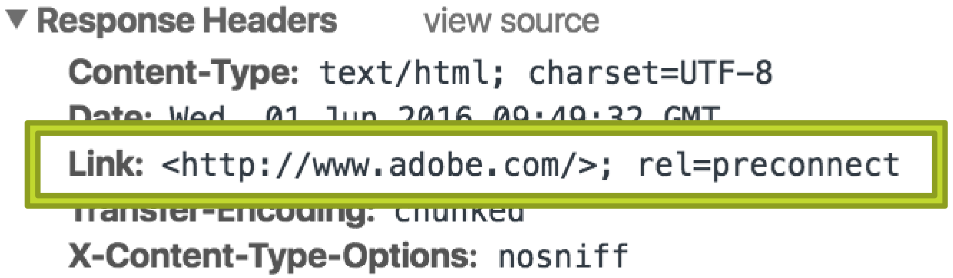
Preload & Resource Hints

- dns-prefetch
- preconnect
- prefetch
  - Subsequent navigation
- prerender
- preload
  - Current navigation

- As HTTP header or link tag

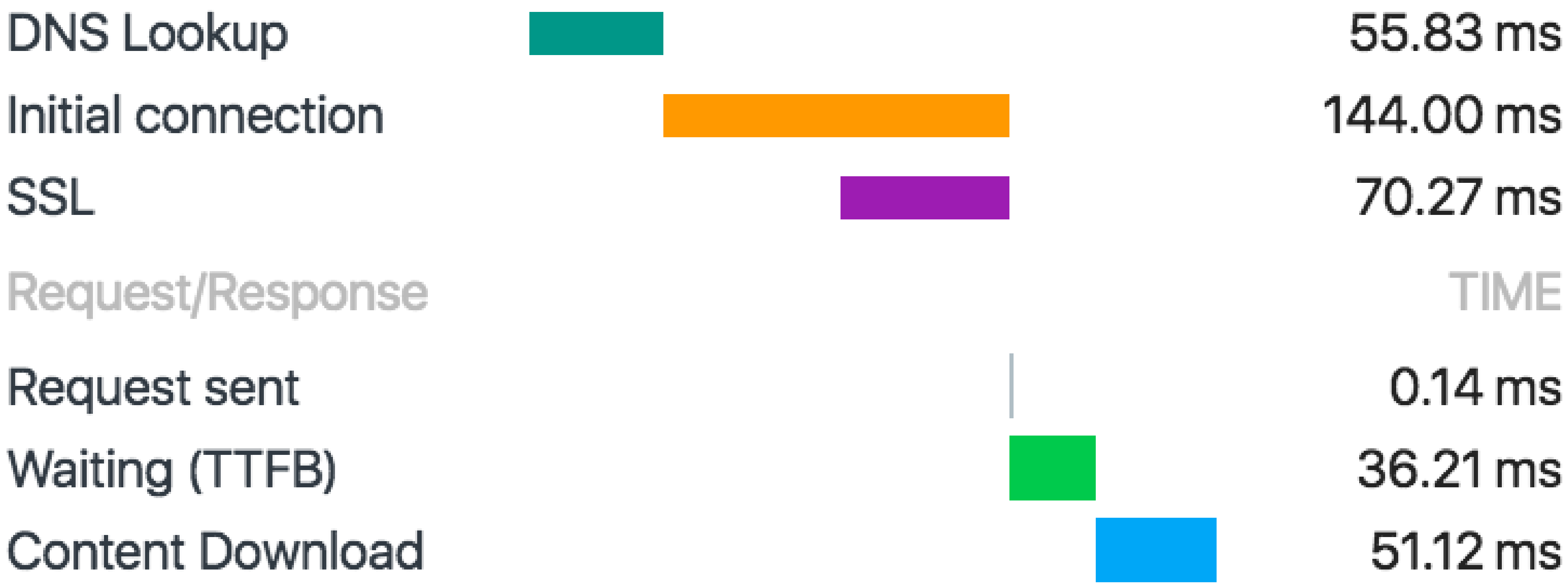


```
<link rel="preconnect"
      href="https://www.adobe.com">
```



```
▼ Response Headers        view source
    Content-Type: text/html; charset=UTF-8
    Date: Wed, 01 Jun 2016 09:49:32 GMT
    Link: <http://www.adobe.com/>; rel=preconnect
    Transfer-Encoding: chunked
    X-Content-Type-Options: nosniff
```

HTTPS Connection Initialization



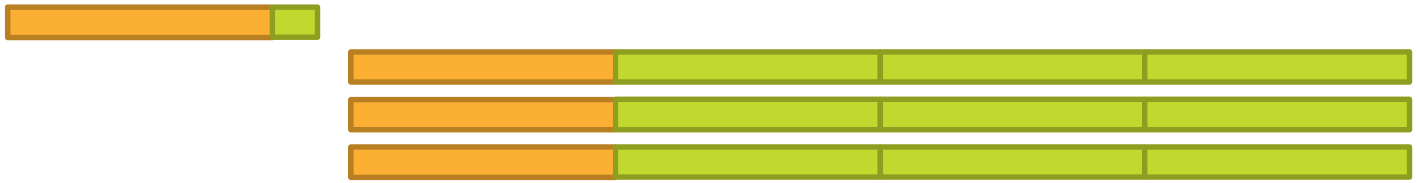
DNS Lookup	55.83 ms
Initial connection	144.00 ms
SSL	70.27 ms
Request/Response	TIME
Request sent	0.14 ms
Waiting (TTFB)	36.21 ms
Content Download	51.12 ms

What about HTTP/1.1?

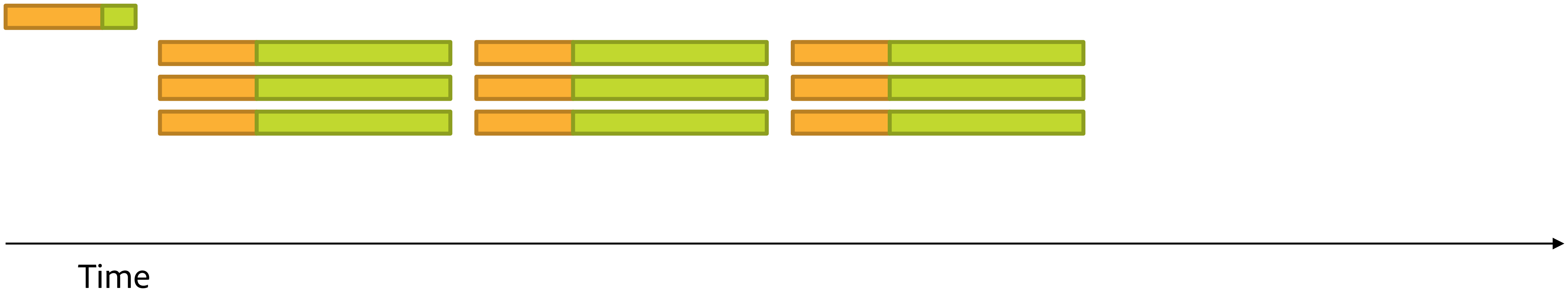
🟧 Latency

🟩 Download

- Reduce number of requests:

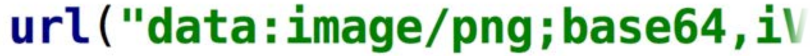


- Reduce latency (CDN):



HTTP/1.1: Reduce Number of Requests

- Concatenate JavaScript & CSS
- Images:
  - Inline icons (Data URI)
  - Image sprites
  - CSS substitute
- Inline CSS into <head>
- Combine JSON responses



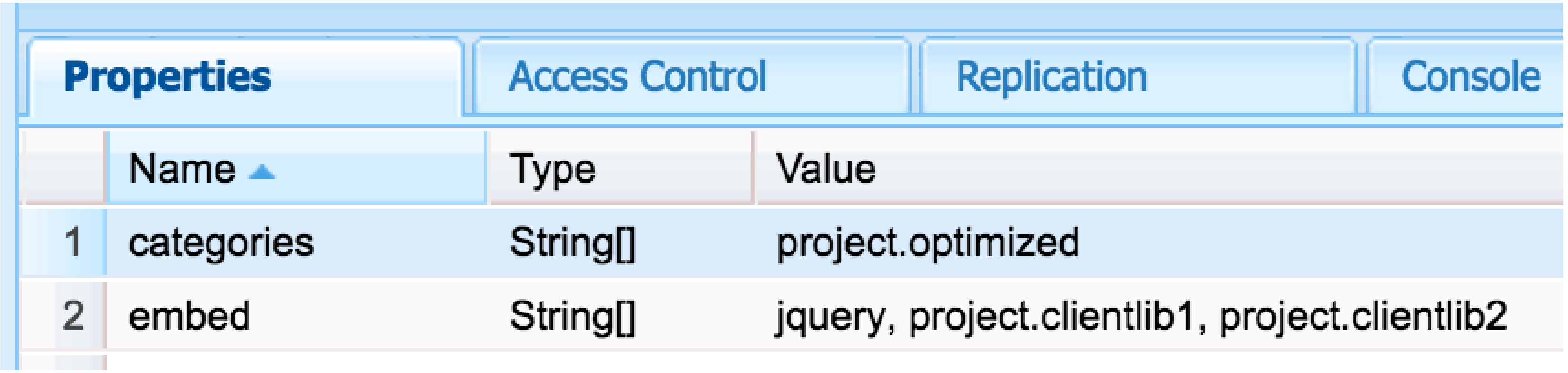
```
url("data:image/png;base64,iV
```

Ps
En
Ae
Pr
Id
Fl
Fb
Ai
Br
Fw
Dw
Au
Sg
Pl
Lr

adobe-icons.png

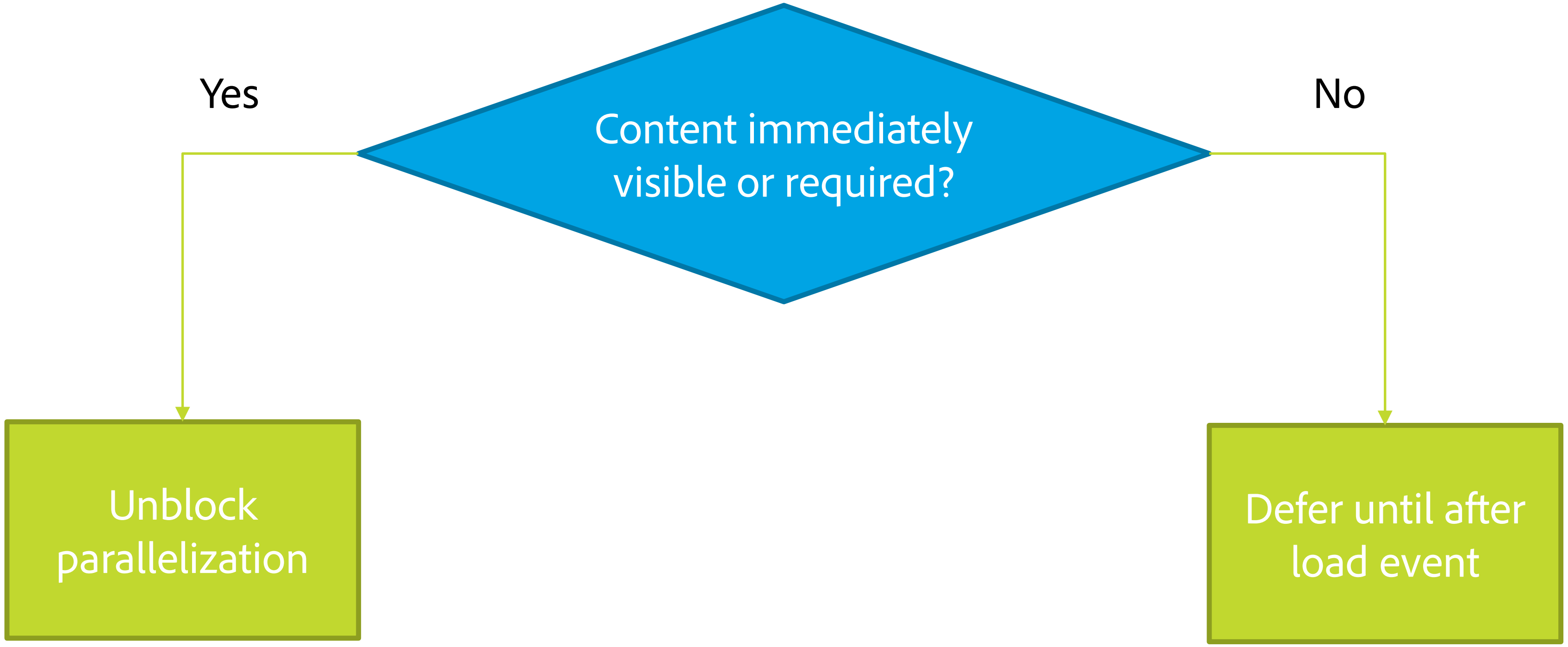
Concatenate JavaScript and CSS

- Create separate embedding client library
  - Use “embed” instead of “dependencies”
  - Only direct dependencies are embedded



	Name ▲	Type	Value
1	categories	String[]	project.optimized
2	embed	String[]	jquery, project.clientlib1, project.clientlib2

Divide & Conquer



Content immediately visible or required?

Yes

Unblock parallelization

No

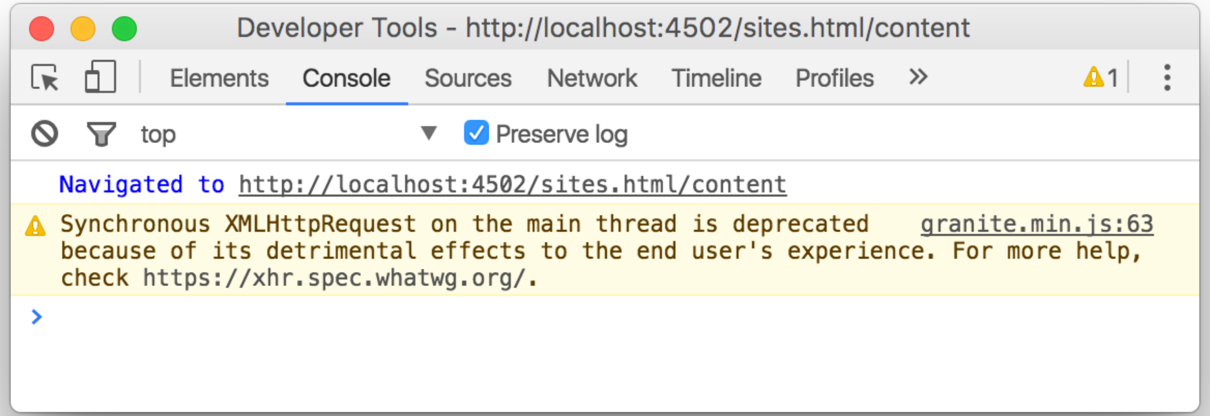
Defer until after load event

Unblock Parallelization

- Don’t block & don’t delay

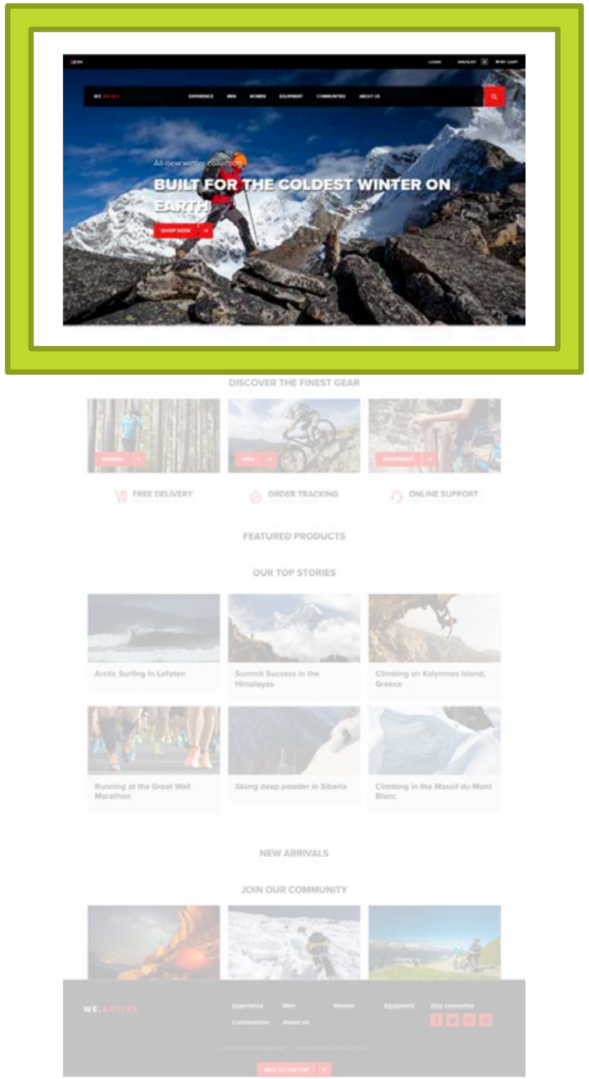
- Blocking examples:
  - Slow JavaScript
  - Synchronous AJAX

- Delaying examples:
  - Load important images with JavaScript
  - Recursive dependency resolution



```
Navigated to http://localhost:4502/sites.html/content
⚠ Synchronous XMLHttpRequest on the main thread is deprecated    granite.min.js:63
because of its detrimental effects to the end user's experience. For more help,
check https://xhr.spec.whatwg.org/.
>
```

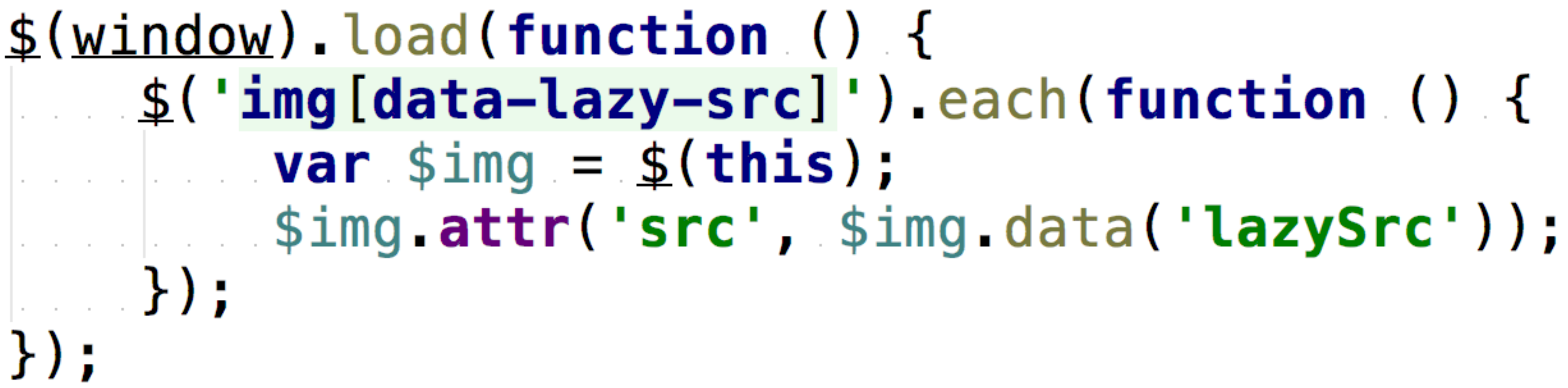
Lazy-load Hidden Images


All-new winter collection
BUILT FOR THE COLDEST WINTER ON EARTH
SHOP NOW
DISCOVER THE FINEST GEAR
FREE DELIVERY
ORDER TRACKING
ONLINE SUPPORT
FEATURED PRODUCTS
OUR TOP STORIES
Arctic Surfing in Lofoten
Summit Success in the Himalayas
Climbing on Kalymnos Island, Greece
Running at the Great Wall Marathon
Skiing deep powder in Siberia
Climbing in the Massif du Mont Blanc
NEW ARRIVALS
JOIN OUR COMMUNITY
WE.ACTIVE

Lazy-load Hidden Images

- Options:
  - AEM Core WCM Components: Image Component
  - Accelerated Mobile Pages Project: amp-img
  - Lazy Load Plugin for jQuery

- Few lines of JavaScript:



```
$(window).load(function () {
    $('img[data-lazy-src]').each(function () {
        var $img = $(this);
        $img.attr('src', $img.data('lazySrc'));
    });
});
```

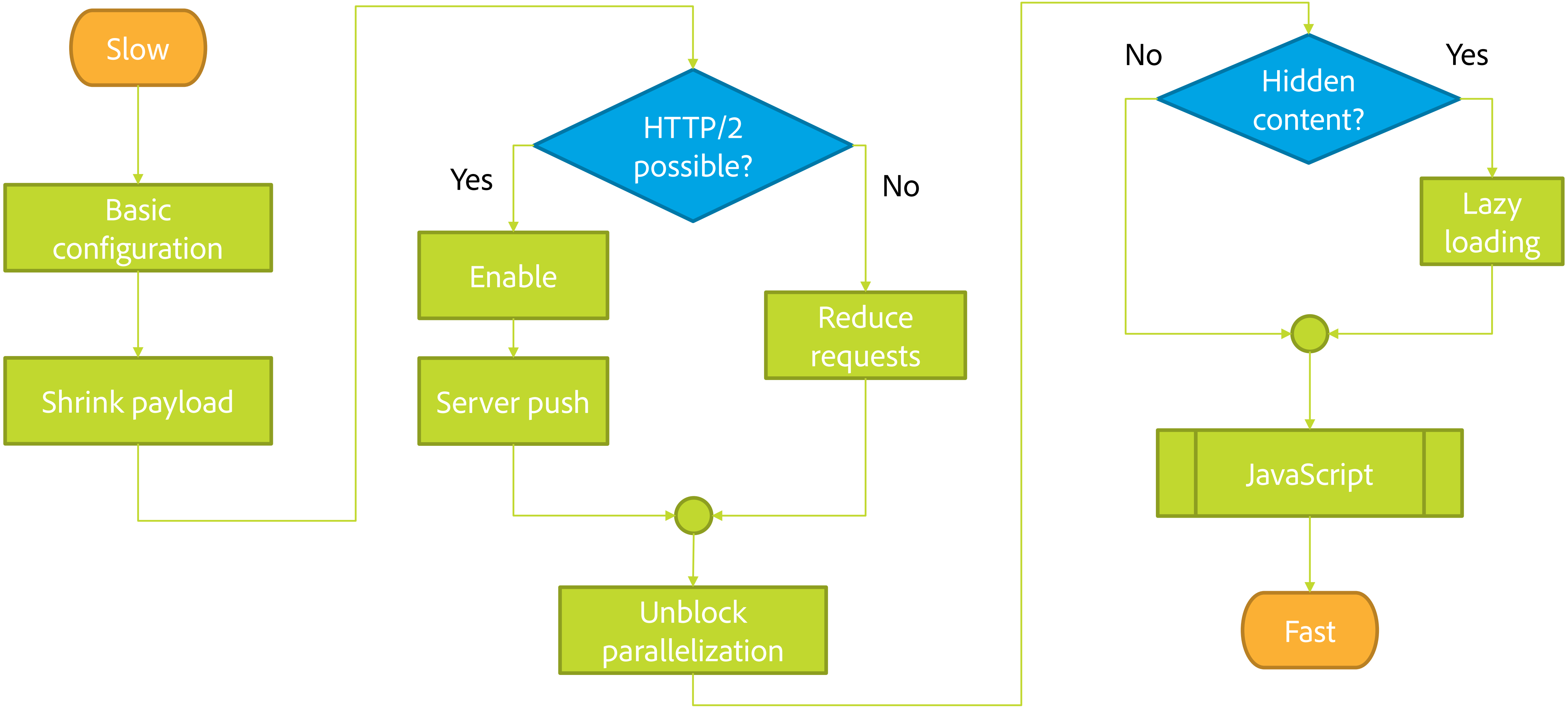
Rethink Integrations

- Load optional integrations lazily

- Pick one integration per type
  - One tag manager solution
  - One analytics solution
  - …

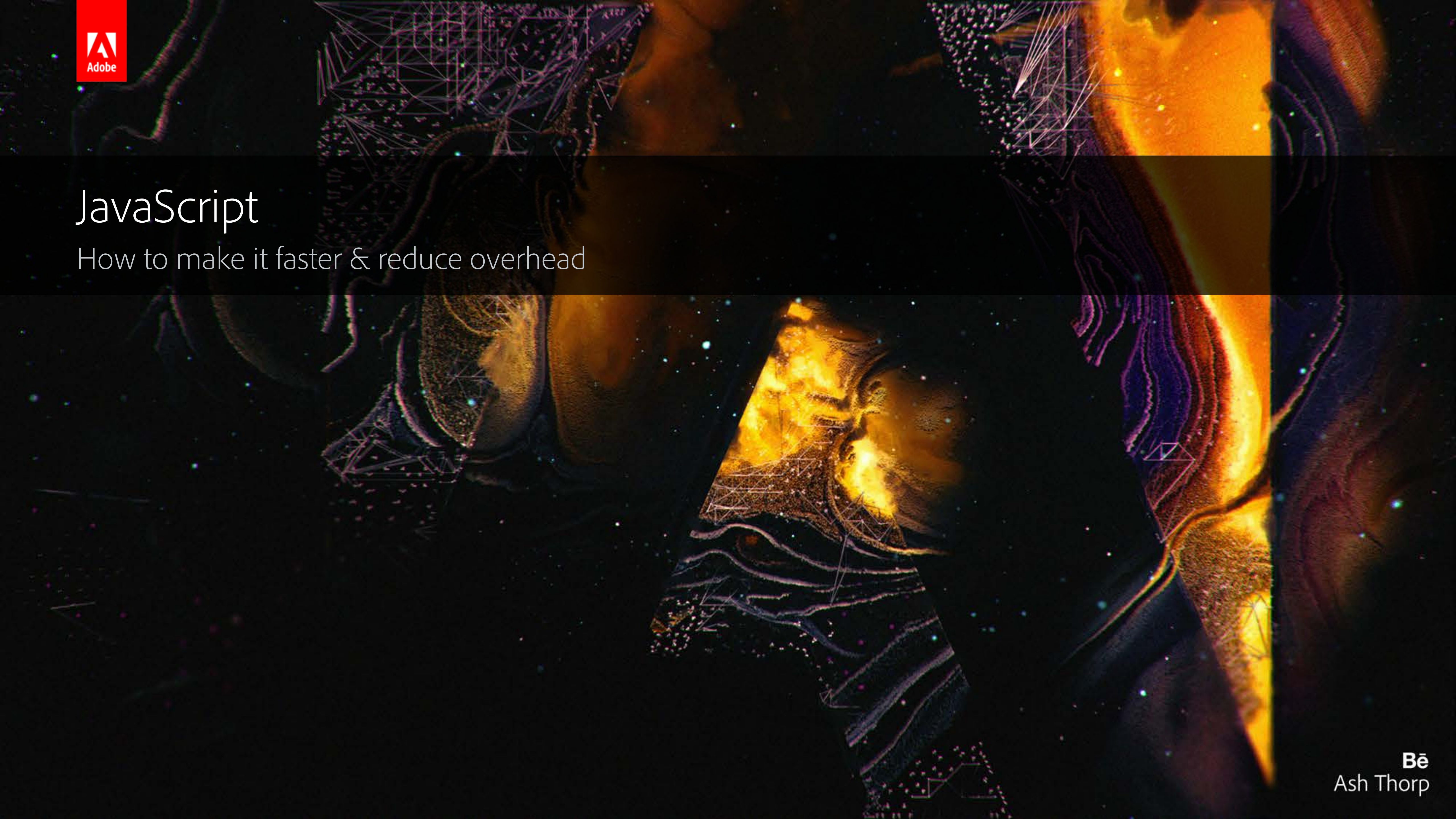
- Leverage resource hints
  - preconnect

Network Summary



JavaScript

How to make it faster & reduce overhead



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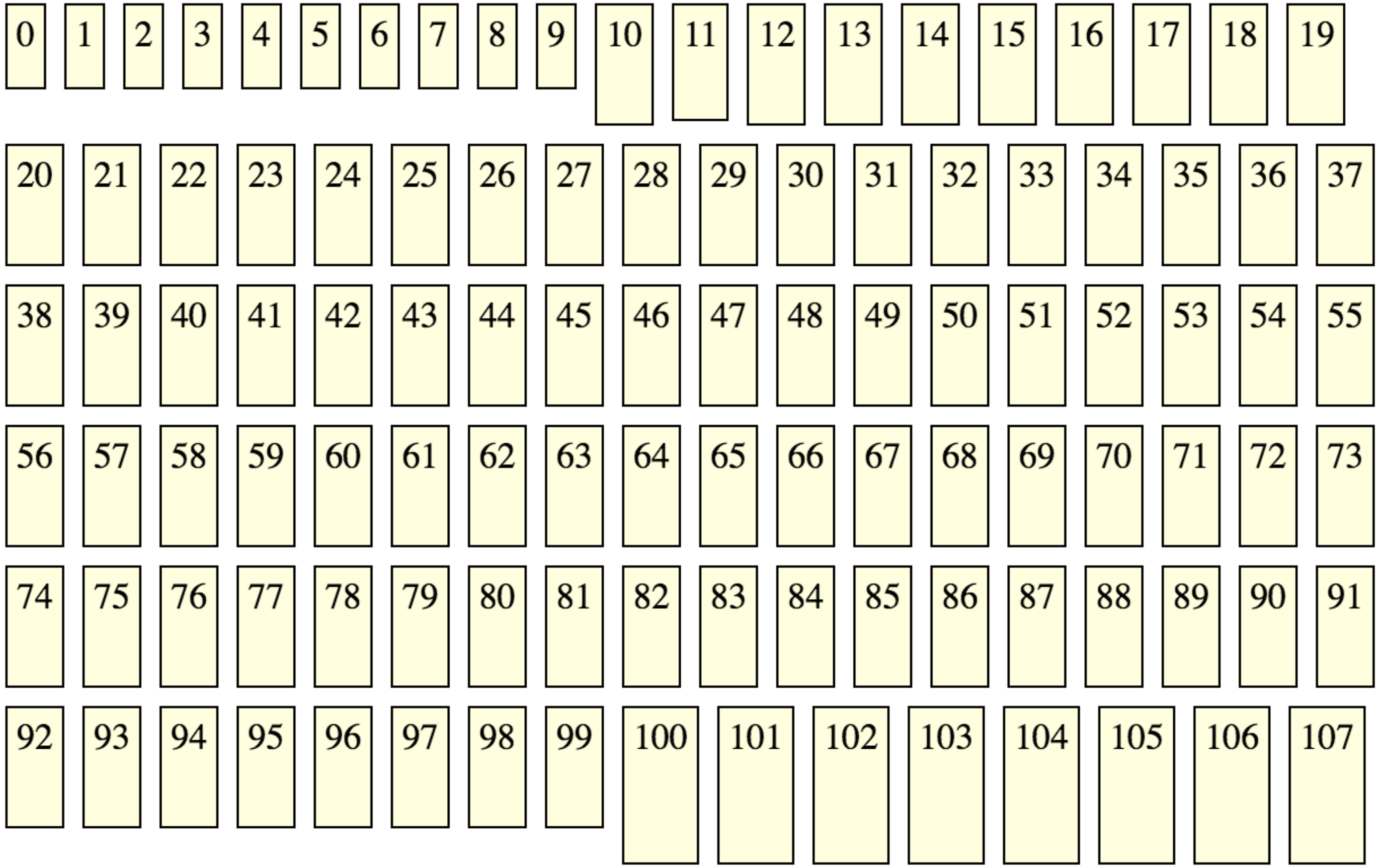
Profiling Example



Minimizing Reflows & Restyles

- Group layout/style **read** operations:
  - $el.width(), $el.css()
  - el.offsetLeft, window.getComputedStyle()

- Group layout/style **write** operations:
  - $el.width(width), $el.css(properties)
  - el.style.property = value

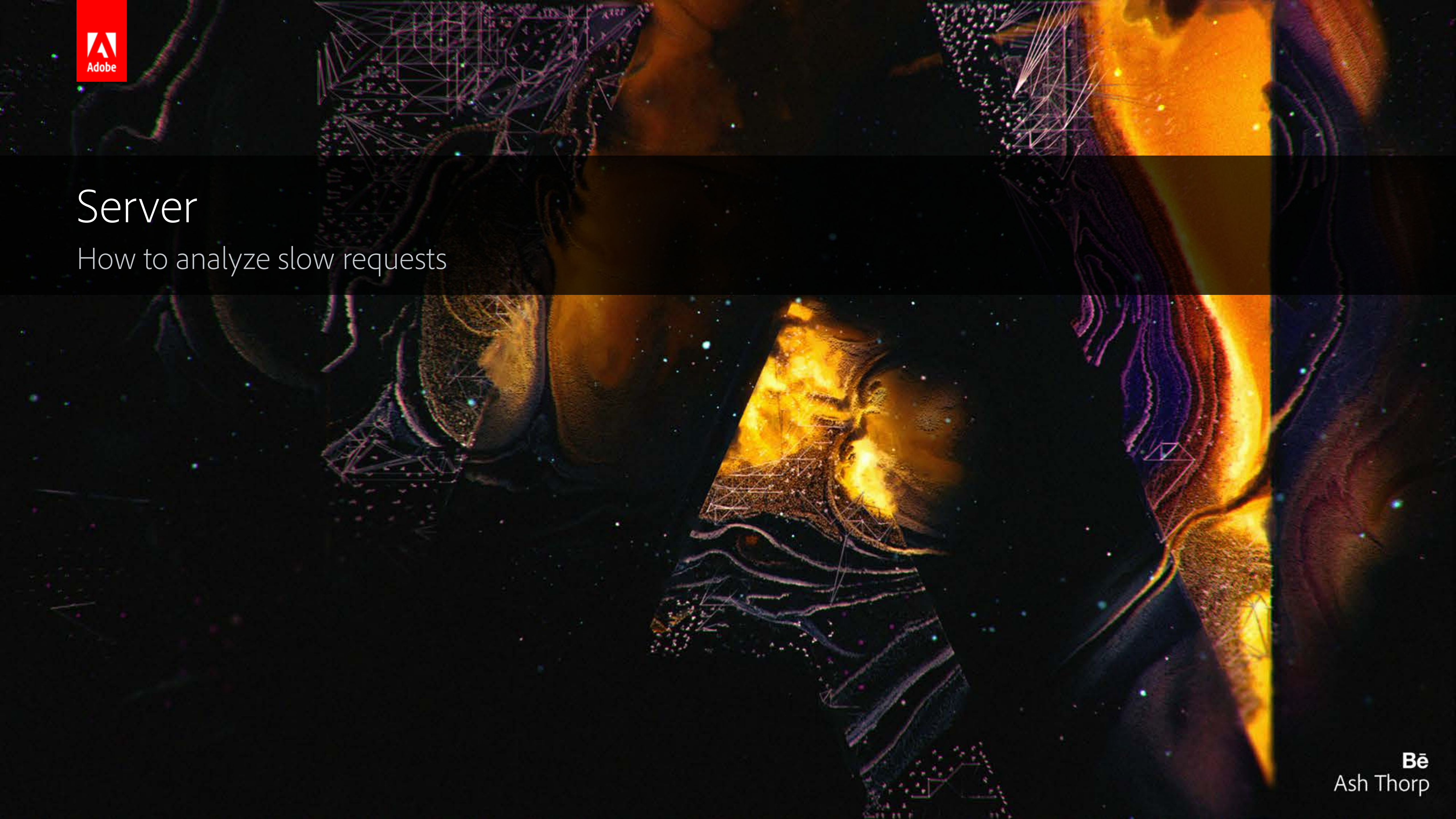
- Comprehensive list: https://gist.github.com/paulirish/5d52fb081b3570c81e3a

The Cost of a JavaScript Library

- Transmission
- Parsing
- Compilation
- Execution
- Event listeners
- Garbage Collection

Server

How to analyze slow requests



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Common Issues

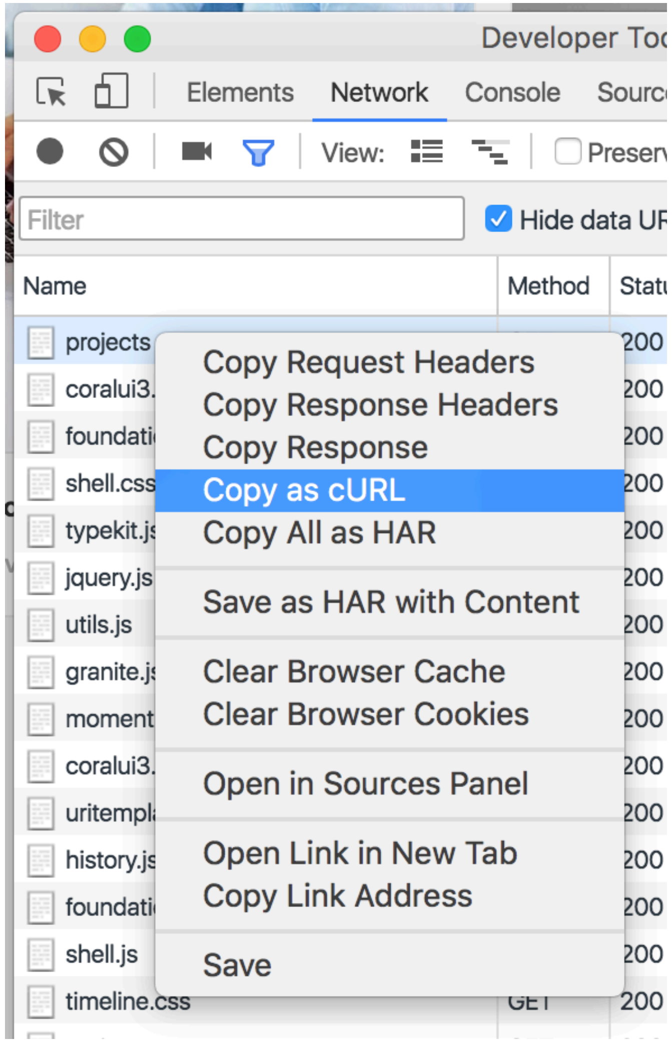
- Slow queries
  - Missing index definitions
- Tree traversal with cache misses
  - Document Store (MongoDB)
- Session leaks
  - MBean for long-running sessions
- Lots of Sling includes
  - Bindings overhead

Built-in Tools

- Editor: Developer Mode
- Diagnosis: Query Performance
- Diagnosis: Request Performance
- Monitoring: Repository Statistics (6.2)
- Sling Profiler

Generating Load for Profiling

- Firefox/Chrome:
  - Developer tools network tab: Copy as cURL
- cURL
  - while true; do *CURL_COMMAND* -s > /dev/null; done
- Apache Bench
  - ab -n1000 -A author:author *URL*

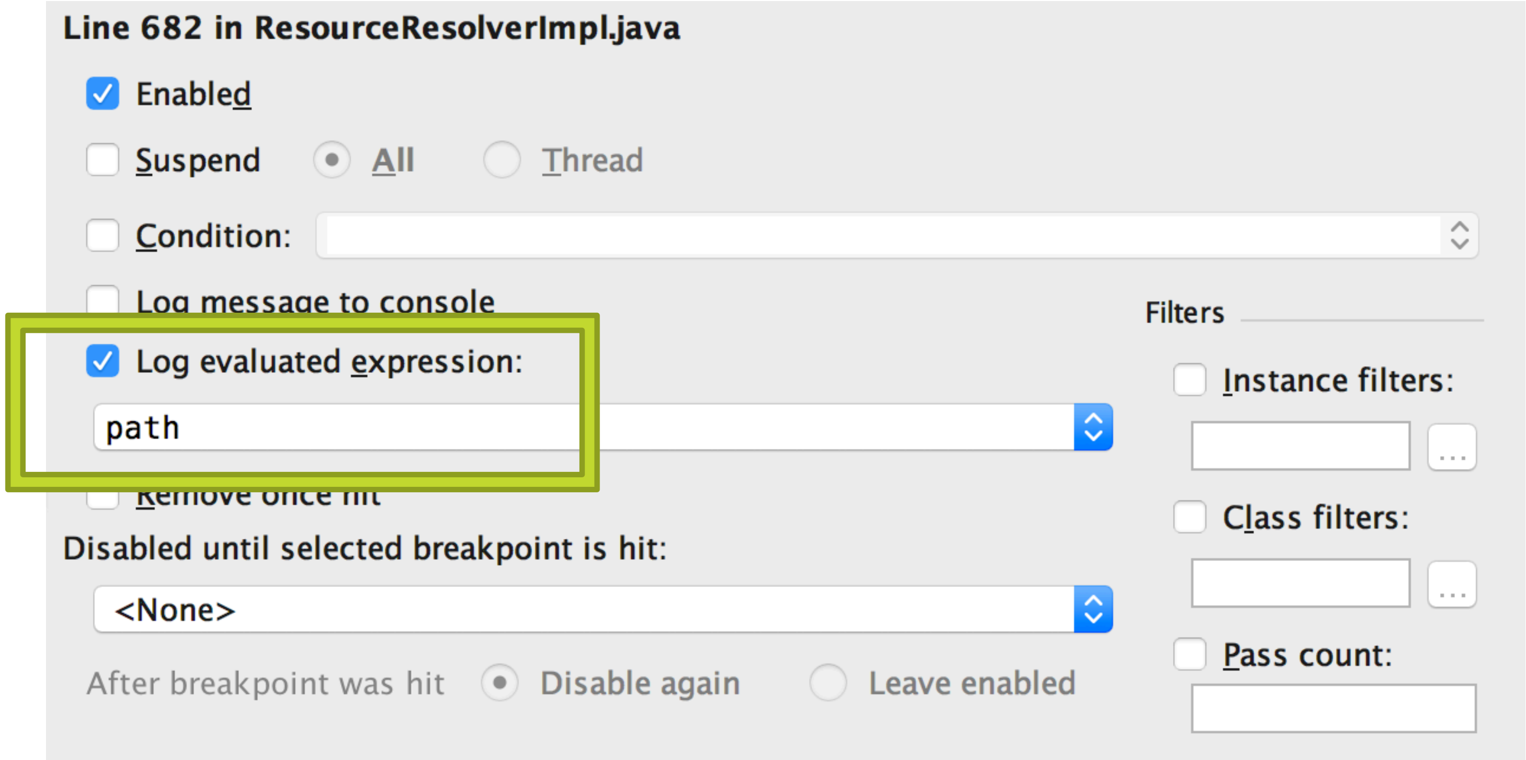


Hot Spots Filtering

What	Search string
Total request time	HttpServlet.service
Sightly components	SightlyJava_
JSP components	_jspService
Sling	.sling.
Oak	.oak.

IDE Breakpoint Logging

- IntelliJ/Eclipse



Line 682 in ResourceResolverImpl.java

☑ Enabled

□ Suspend ● All ○ Thread

□ Condition:

□ Log message to console

☑ Log evaluated expression:

path

□ Remove once hit

Disabled until selected breakpoint is hit:

<None>

After breakpoint was hit ● Disable again ○ Leave enabled

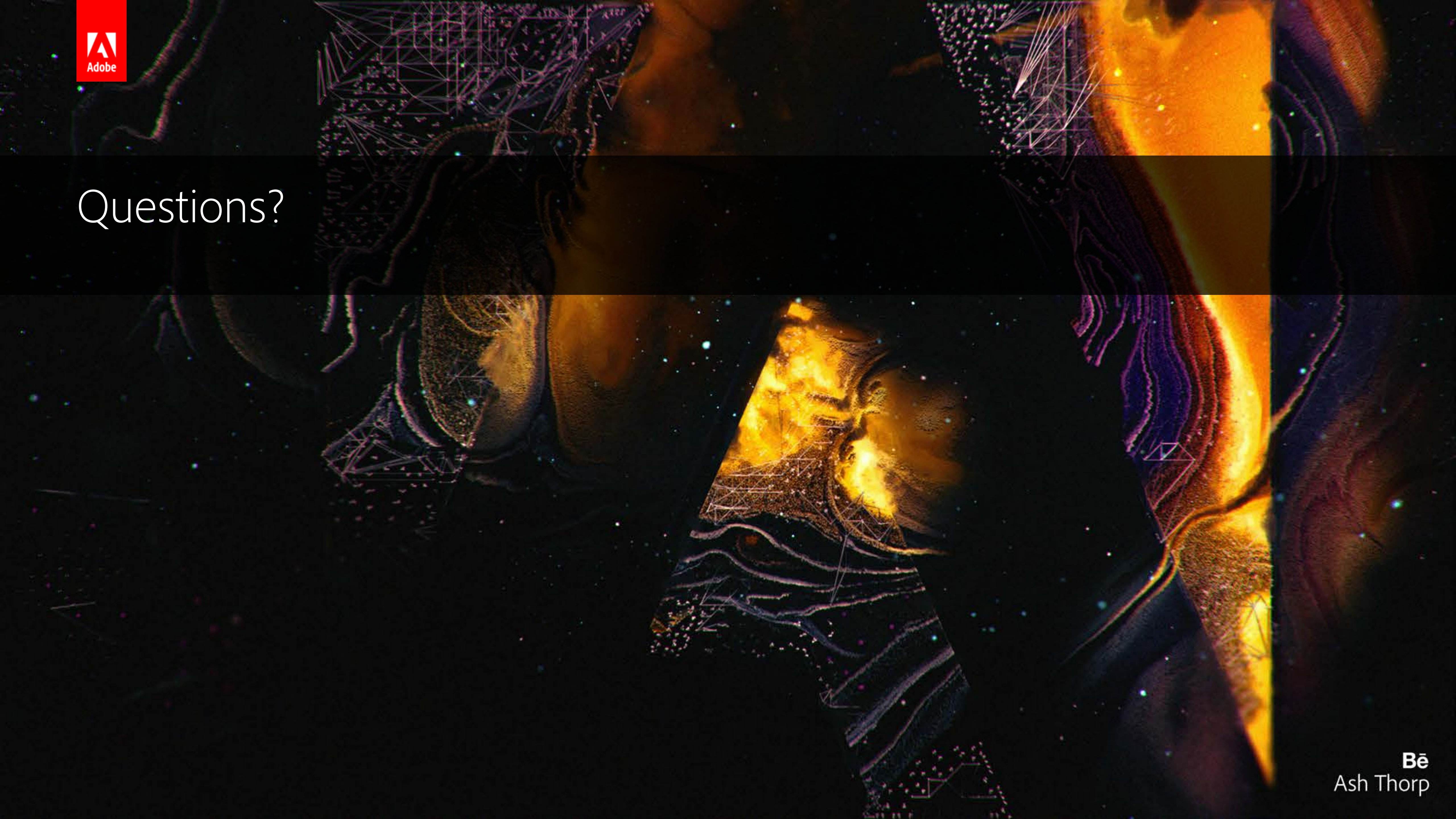
Filters

□ Instance filters:

□ Class filters:

□ Pass count:

Questions?



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