THE CUSTOMER SUCCESS PLATFORM
SALES SERVICE MARKETING COMMUNITY ANALYTICS

Developing High Performance Web Apps

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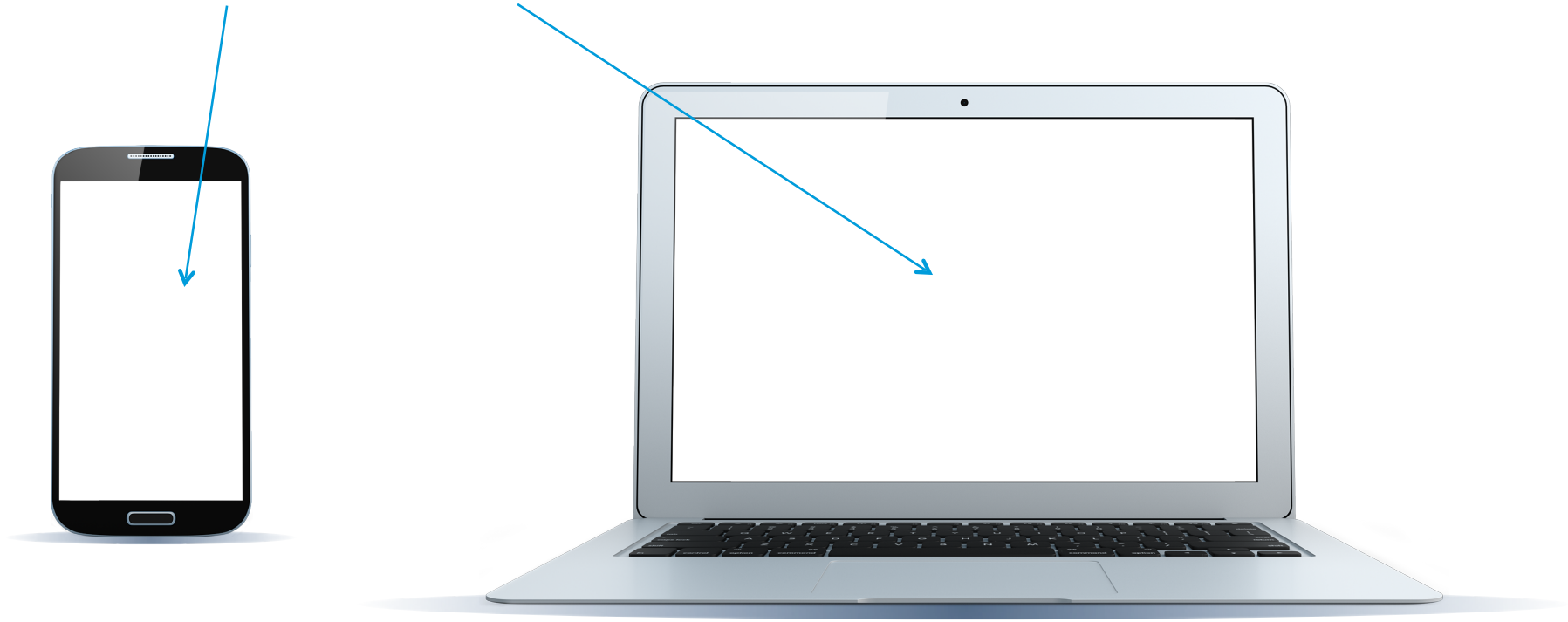
Session Overview

- What is Jank?
- How to find out if you have a problem
- Example issues and resolutions
  - Layout thrashing
  - Debouncing events / chunky scrolling

What is Jank?

When we are below:

- 60 FPS
- 60Hz (1 Frame every 16ms)
- Maybe 30's ok.



Browser reflows

What actually Happens

1. Style Calculations
2. Layout
3. Painting

Browser Flow Step 1:

Recalculating Styles

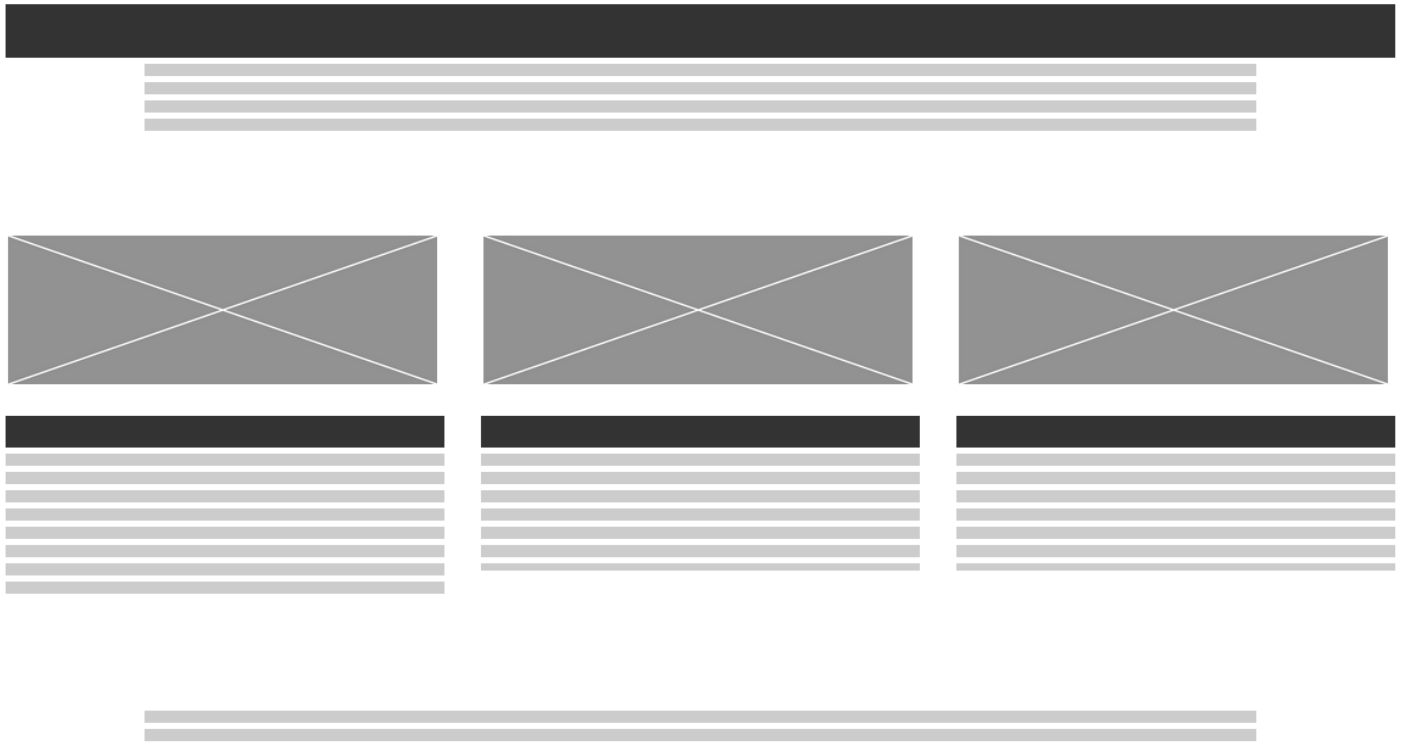
- HTML is parsed and the DOM tree is developed taking into account all the elements on the page and CSS styles.

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <!-- Meta, title, CSS, favicons, etc. -->
    <meta charset="utf-8">
<meta http-equiv="X-UA-Compatible" content="IE=edge">
<meta name="viewport" content="width=device-width, initial-scale=1">
<meta name="description" content="Bootstrap, a sleek, intuitive, and powerful mobile first front-end framework for faster and easier web development.">
<meta name="keywords" content="HTML, CSS, JS, JavaScript, framework, bootstrap, front-end, frontend, web development">
<meta name="author" content="Mark Otto, Jacob Thornton, and Bootstrap contributors">

<title>

    Bootstrap

</title>

<!-- Bootstrap core CSS -->
<link href="../dist/css/bootstrap.min.css" rel="stylesheet">


<!-- Documentation extras -->
<link href="../assets/css/docs.min.css" rel="stylesheet">
<!--[if lt IE 9]><script src="../assets/js/ie8-responsive-file-warning.js"></script><![endif]-->
<!-- IE10 viewport hack for Surface/desktop Windows 8 bug -->
<script src="../assets/js/ie10-viewport-bug-workaround.js"></script>
<script src="../assets/js/ie-emulation-modes-warning.js"></script>

<!-- HTML5 shim and Respond.js IE8 support of HTML5 elements and media queries -->
<!--[if lt IE 9]>
  <script src="https://oss.maxcdn.com/html5shiv/3.7.2/html5shiv.min.js"></script>
  <script src="https://oss.maxcdn.com/respond/1.4.2/respond.min.js"></script>
<![endif]-->

<!-- Favicons -->
<link rel="apple-touch-icon-precomposed" href="/apple-touch-icon-precomposed.png">
<link rel="icon" href="/favicon.ico">

<script>
  (function(i,s,o,g,r,a,m){i['GoogleAnalyticsObject']=r;i[r]=i[r]||function(){
  (i[r].q=i[r].q||[]).push(arguments)},i[r].l=1*new Date();a=s.createElement(o),
  m=s.getElementsByTagName(o)[0];a.async=1;a.src=g;m.parentNode.insertBefore(a,m)
  })(window,document,'script','//www.google-analytics.com/analytics.js','ga');
  ga('create', 'UA-146052-10', 'getbootstrap.com');
  ga('send', 'pageview');
</script>

  </head>
  <body class="bs-docs-home">
    <a class="sr-only sr-only-focusable" href="#content">Skip to main content</a>

    <!-- Docs master nav -->
    <header class="navbar navbar-static-top bs-docs-nav" id="top" role="banner">
  <div class="container">
    <div class="navbar-header">
      <button class="navbar-toggle" type="button" data-toggle="collapse" data-target=".bs-navbar-collapse">
        <span class="sr-only">Toggle navigation</span>
        <span class="icon-bar"></span>
        <span class="icon-bar"></span>
        <span class="icon-bar"></span>
      </button>
      <a href="../" class="navbar-brand">Bootstrap</a>
```

Browser Flow Step 2:

Layout

- The browser develops the size of all the elements on screen and how they will impact each other.
- HTML is interesting as the layout is dynamic enough that elements in the same layer will impact the position of other elements.



Browser Flow Step 3:

Paint

- The browser generates a lot of pixels in the exact right spot and color

Designed for everyone, everywhere.

Bootstrap makes front-end web development faster and easier. It's made for folks of all skill levels, devices of all shapes, and projects of all sizes.

Sass {less}

Preprocessors

Bootstrap ships with vanilla CSS, but its source code utilizes the two most popular CSS preprocessors, Less and Sass. Quickly get started with precompiled CSS or build on the source.

One framework, every device.

Bootstrap easily and efficiently scales your websites and applications with a single code base, from phones to tablets to desktops with CSS media queries.

Full of features

With Bootstrap, you get extensive and beautiful documentation for common HTML elements, dozens of custom HTML and CSS components, and awesome jQuery plugins.

Bootstrap is open source. It's hosted, developed, and maintained on GitHub.

What triggers browser reflows?

- Page Load
- JS Methods

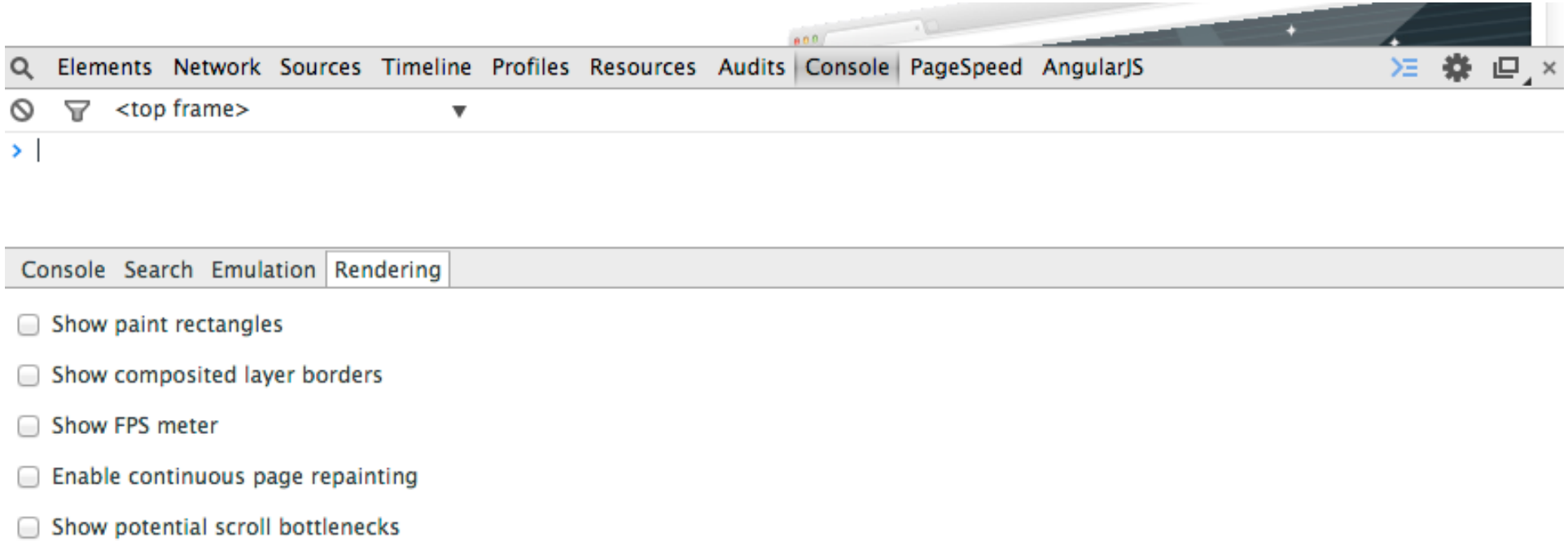
element	clientHeight
element	clientLeft
element	clientTop
element	clientWidth
element	focus()
element	getBoundingClientRect()
element	getClientRects()
element	innerText
element	offsetHeight
element	offsetLeft
element	offsetParent
element	offsetTop
element	offsetWidth
element	outerText
element	scrollByLines()
element	scrollByPages()
element	scrollHeight
element	scrollIntoView()
element	scrollIntoViewIfNeeded()
element	scrollLeft
element	scrollTop
element	scrollWidth
window	getComputedStyle()
window	scrollBy()
window	scrollTo()
window	scrollX
window	scrollY
window	webkitConvertPointFromNodeToPage()
window	webkitConvertPointFromPageToNode()

In short, lots of stuff you use a lot in javascript!

Source: http://gent.ilcore.com/2011/03/how-not-to-trigger-layout-in-webkit.html

How do we find out we have a problem?

Chrome dev tools! Add text to yellow div



Layout Thrashing Demo

Chunky Scrolling Demo

Resources

- http://updates.html5rocks.com/tag/performance
- http://jankfree.org/

QA

- Mike Tetlow
- Bracket Labs
- @Mikename

All about Bracket Labs

Award-winning AppExchange ISV Partner selling productivity apps. 100% native architecture, focus on usability and simplicity. Founded 2010, Boulder CO

- Campaign Calendar – Top 10 app in Marketing category
- TaskRay – Top app in Project Management and Collaboration categories
- MyDay – Launched Dreamforce 2013
- Notable customers include GE, NBCUniversal, Kelly Services, Tata Communications, Forbes, Houghton Mifflin