BOOTSTRAPPING WEB PAGES FOR ACCESSIBILITY AND PERFORMANCE

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About Cerner Corporation

- Healthcare Information Technology company
- Has the largest, most strategic HIT client footprint
- Solutions spanning physician offices, hospitals, clinics, laboratories, pharmacies, and consumers' homes
- Founded in 1979, based in Kansas City, Missouri, USA
- 7,600 associates worldwide
- http://www.cerner.com

Purpose of this Presentation

- To share our approach and results
- To garner feedback from community-at-large
- Derive better solution… ?
- Gauge interest in open-source… ?

What is the problem ?

"How accessible should

MTV

make their website ?"

Definition of Accessibility

"Technology is considered accessible if it can be used as effectively by people with disabilities as by those without"

as well as by those with less-than-modern means.

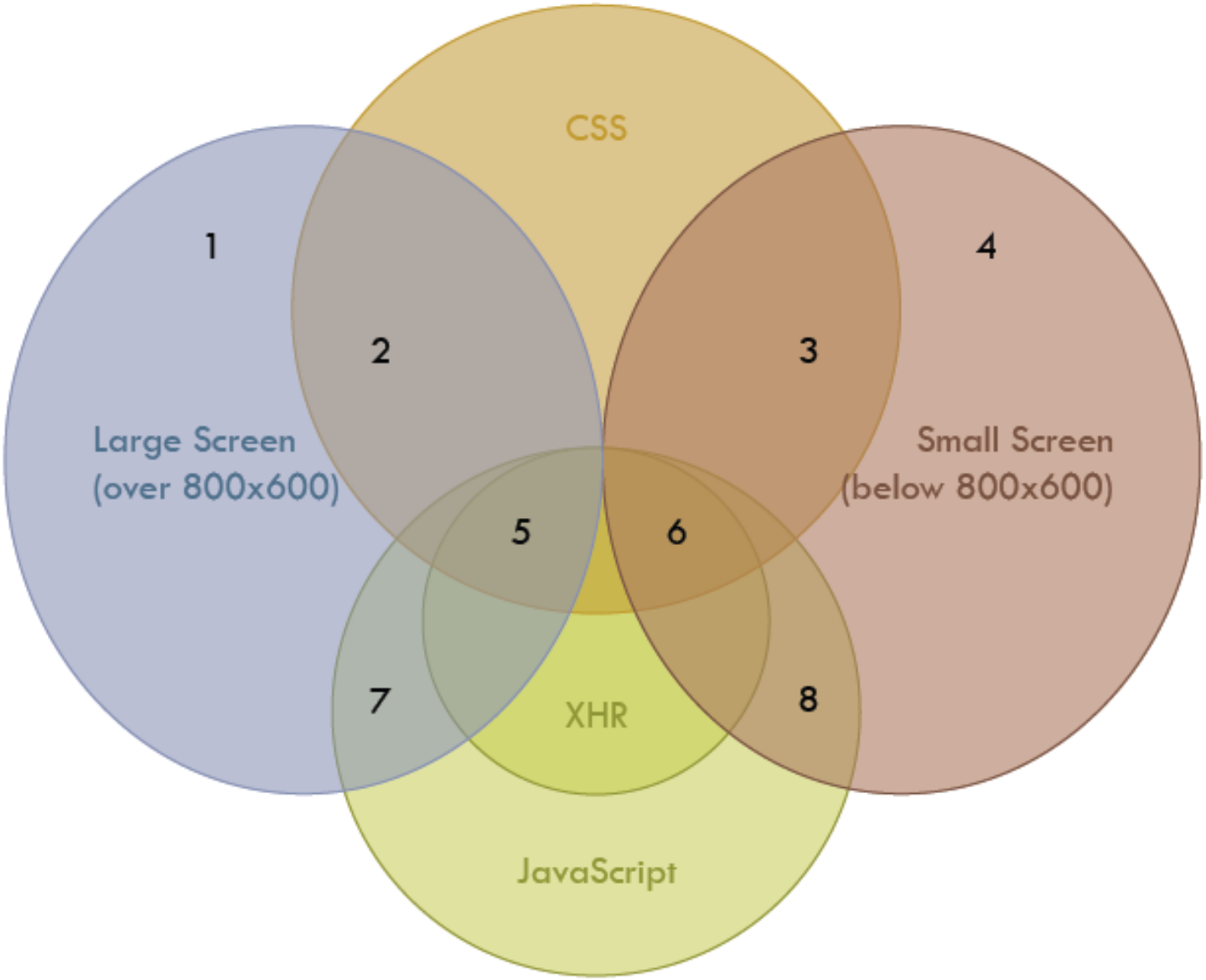
Thatcher, Jim. Web Accessibility – Section 508
http://jimthatcher.com/webcourse1.htm

Physical + Technology Accessibility

- Cerner must accommodate **technology accessibility**
- Those most in need of our solutions don't have, or can't afford, the latest technology
  - Developing world
  - "Sickest-of-the-sick"
  - Aging populations, ("hand-me-ups")
- Technology improves dramatically year-to-year

Yet, as they are considered medical devices by the FDA,
our solutions are tested with a strict process;
even the smallest changes may wait for the next release.

Such a Broad Landscape



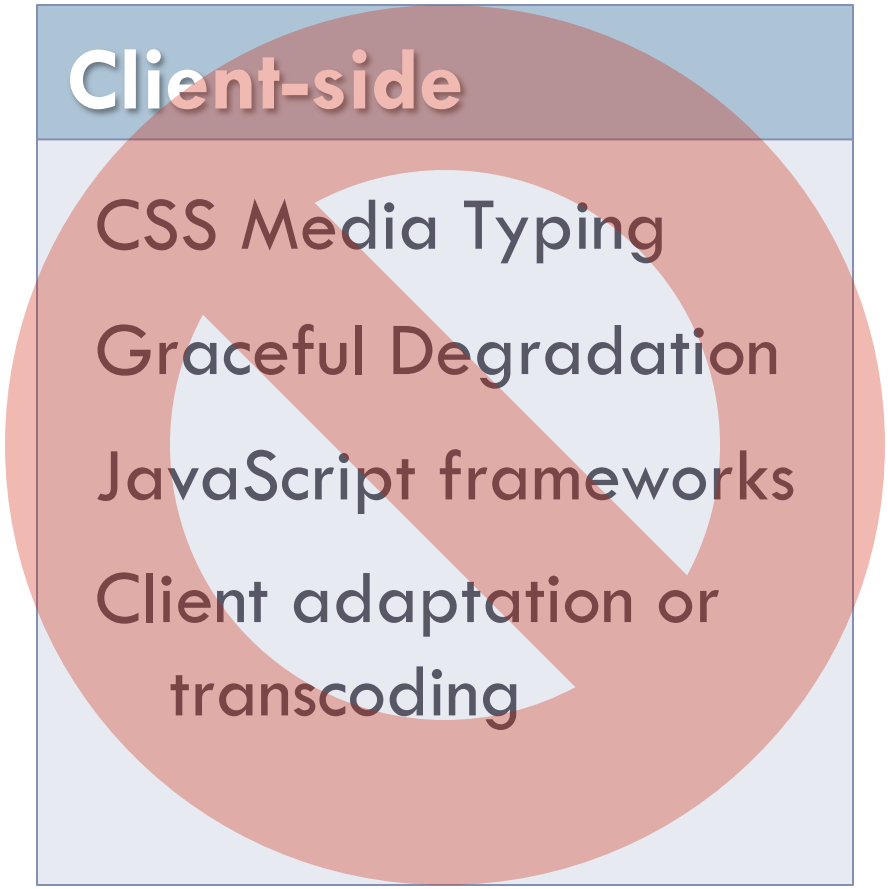
1. Older Browsers
2. Script Disabled
3. Palm Blazer
4. WAP
5. Modern Browser
6. iPhone
7. Screen Reader
8. Blackberry

Current Solutions

Server-side

- Alternate site
- User Agent Detection
- Alternate protocol
- HTML compression or adaptation

Client-side



- CSS Media Typing
- Graceful Degradation
- JavaScript frameworks
- Client adaptation or transcoding

We prefer this logic to be on the server.

What are the goals?

- Support multiple experiences with one HTML codebase
- Target capability rather than specific client or device.
- Support off-document, remote configuration.
- Eliminate extraneous client-side “compatibility code.”
- Deliver resources passively, with better performance.
- Overcome any business reluctance by adding value.

… to Achieve Physical and Technology Accessibility

What is “Web Bootstrapping” ?

In computing, bootstrapping (from an old expression "to pull oneself up by one's bootstraps") is a technique by which a simple computer program activates a more complicated system of programs.

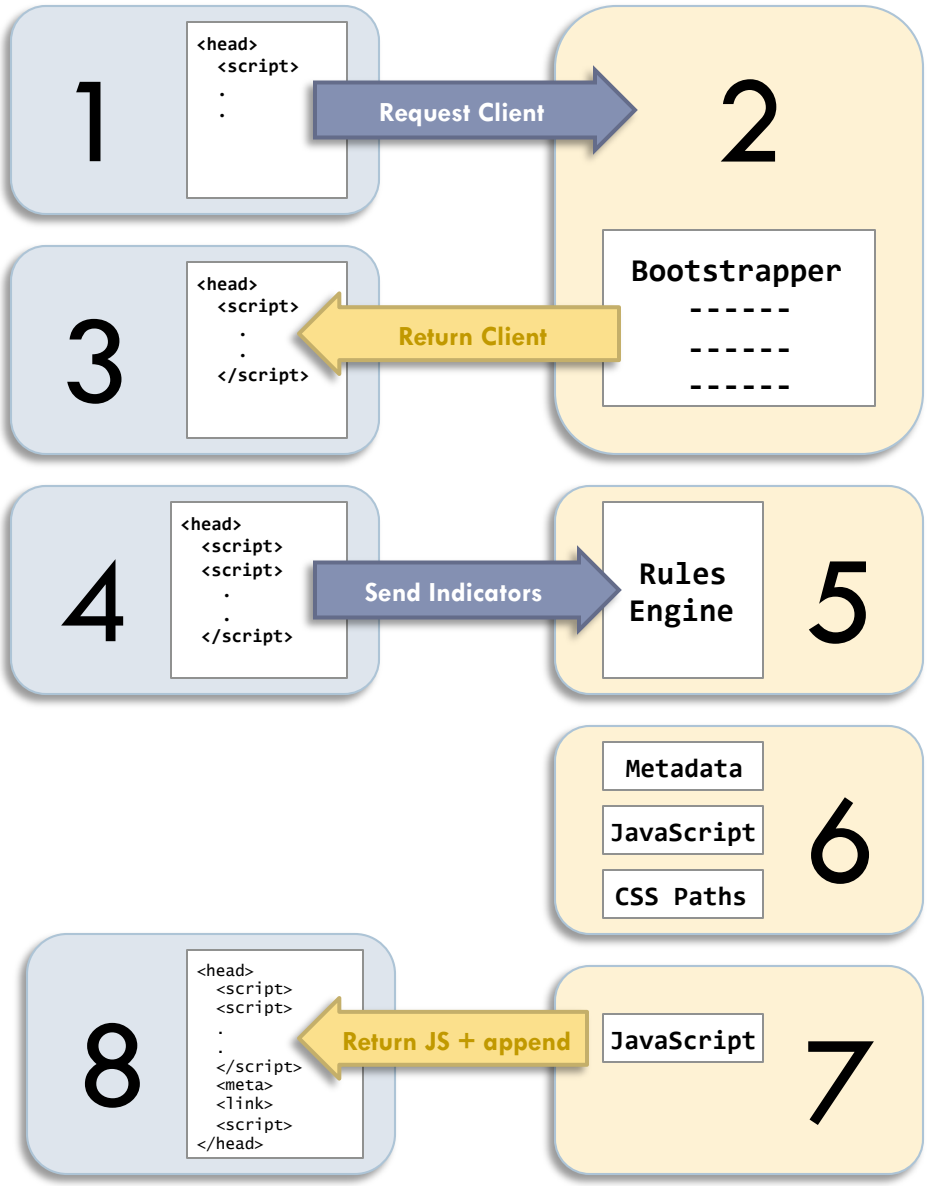
- Wikipedia

Web Bootstrapping is a process by which an accurate collection of only those static resources and metadata necessary for an experience are delivered **passively,** by the **best performing means possible.**

In contrast to existing methodologies, this approach determines these resources based on capability, form factor and platform by collecting the often immutable attributes of the client, not just its identity or version.

How does Web Bootstrapping work?

1. HTML served with a single script include, requesting the Bootstrapper Client.
2. Configured Bootstrapper Client delivered.
3. Client collects browser attributes.
4. Client appends script element to HEAD; URI contains attributes as parameters.
5. Attributes, user-agent passed to Rules Engine.
6. Specified rules executed, resulting in list of metadata and paths to script, CSS files.
7. JavaScript result containing, (in order):
   - Calls to write meta data to HEAD;
   - Calls to write CSS paths to HEAD;
   - Concatenated script, if possible;
   - Calls to write JS paths to HEAD.
8. Result executed, page complete.



Web Bootstrapper Demonstration

(URL will be provided at the end)

Cerner's Bootstrapper Implementation

- Purely semantic HTML, devoid of any JavaScript events.
- Bootstrapper Server-side: **Java EE Servlet**
- Rules Engine: **JBoss Drools**
  - Fast, simple rules language.
  - Rules can be edited and reloaded at run-time.
- Most complicated configuration to date: **5 skins**
  - Standards-based (Webkit, Mozilla, IE6+, etc)
  - Nintendo Wii
  - iPhone
  - Mobile+ (Blackberry, Palm, PocketPC, etc)
  - All others (IE5.5-, no JS, WAP, etc)

Improve Performance: Loading Methods

The Loading Method can be specified at build or run-time:

HTML: Content written via JavaScript prior to DOM parse.
Poorest performance, but allows for in-source evaluations.

NETWORK: Resources delivered in a single Bootstrapper call.
Desirable if the JavaScript payload is small.

CONCURRENCY: Resources delivered in two phases:
Pass 1: CSS and Meta Data added, call for second pass.
Pass 2: Delivers full JavaScript payload.

Allows for larger JavaScript payloads to be downloaded after the other static content. Otherwise, CSS painting may be forced to wait while JavaScript load completes.

Benefits for Developers & Users

- Solutions adhere to tenets of Progressive Enhancement
  - Bottom-up, most accessible design
  - Pages are enhanced upward by CSS, Script
- Only the code necessary for that skin is downloaded
- Complex resource determination logic outside the browser
  - Preserves client-side resources
  - Promotes an agnostic browser philosophy
- Best practices for optimal performance around resource loading are integrated and applied automatically

Benefits for Business

- Infinite skins possible, no code refactoring required
- New skins can be added without rewrites
- Accessibility achieved with less effort
  - *It is inherent in the approach*
- Bugs can be resolved without redeployment

Unexpected Benefits

- **New Browser Adoption**: When new browsers appear, new skins available without changing any source code.
- **Blacklisting**: Able to blacklist a version of Opera until we could fix a bug. Users saw semantic, "skinless" version. Older browsers (e.g. IE5.5-) also load this skin.
- **Cross Domain Scripting**: By using Apache HTTPClient, externally hosted JS libraries, (e.g. jQuery, Prototype) can be loaded. Added to the Bootstrapper response, they appear to come from a single domain… avoiding cross-site warnings over HTTPS.

Caveats and Considerations

- Presentation differences != Workflow differences
  - Rearranged workflow for small devices or data load may preempt reuse of site markup.
  - Should always question if an alternate workflow is truly necessary, but in some cases it may be.
- Bootstrapper requires JavaScript
  - Base CSS skin could be included in-source.
  - CSS selectors in base skin “cancelled out” by bootstrapped resources.
  - Skin must be compatible with all browsers.

Contact and Further Reading

Demo Site

https://www.cernerdemos.com/bootstrapper

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Twitter: clintandrewhall

Further Reading

A List Apart: Understanding Progressive Enhancement

http://www.alistapart.com/articles/understandingprogressiveenhancement

Pragmatic Progressive Enhancement

http://icant.co.uk/articles/pragmatic-progressive-enhancement

Steve Souders: High Performance Websites

http://www.stevesouders.com/hpws

JBoss Drools

http://jboss.org/drools/