HELLO!

I am Sang Bui
I am here because I want to learn

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1. BROWSER ARCHITECTURE

2. CROSS BROWSER TESTING

3. CLIENT SIDE BYPASS TESTING
ABOUT MY CURRENT PROJECT

“Testing multiple browsers on multiple platforms”
FUNCTION DEFECT
https://www.linkedin.com/shareArticle?mini=true&url=https%3a%2f%2fwww.abglobal.com%2fdefined-contribution%2fus%2finside-the-minds-of-plan-participant.htm&title=I took AB’s Investor Survey and found out I am a CAPABLE, CONFIDENT INVESTOR&summary=AB queried over 1,000 US workers to help understand their behavior and attitude toward investing for retirement. Some of the results were surprising. Take the survey yourself and find out what type of investor you are.
WHAT IS THE DIFFERENCE BETWEEN THESE BROWSERS?
BROWSER ARCHITECTURE
WHAT’S THE BROWSER?

The browser main functionality is to present the web resource you choose, by requesting it from the server and displaying it on the browser window. The resource format is usually HTML but also PDF, image and more.
WHAT'S THE BROWSER?
USER INTERFACE

The space where interaction between users and the browser.

Most of the browsers have common inputs for user interface:

- Address bar.
- Next and back buttons.
- Buttons for home, refresh and stop
- Bookmark web pages
- …etc.
BROWSER ENGINE

The bridge between

User Interface & Rendering Engine

User Interface

Browser Engine

Rendering Engine
BROWSER ENGINE

Browser Engine provides methods to begin the loading of URL and other high-level browsing actions.

- Reload, Back, Forward actions
- Error messages
- Loading progress
Rendering Engine interprets (render) the HTML, XML, JavaScript and generates the layout that is displayed in the User Interface.

Key component of this phase is HTML, CSS parse.

This is a reason why the browser displays a website so differently.
NETWORKING
Access and transfer data on the internet (calls HTTP, HTTPS, FTP).
The Networking components handles all aspects of internet communication or security.

JAVASCRIPT INTERPRETER
Component parse & executes the JavaScript that is embedded in the website.
Results of the execution a passed to the Rendering Engines for display.
DISPLAY BACKEND
Display common UI components.
Drawing basic widgets like combo boxes, windows.

DATA PERSISTENCE
Storing the data on the client side.
- Cookies.
- Cache.
User Interface

Browser Engine

Rendering Engine

Networking

JavaScript Interpreter

Display Backend

Data persistence

Dependency
FIREFOX ARCHITECTURE

User Interface

UI Toolkit (XPFE)

User Interface

Browser Engine

Rendering Engine

Gecko

Data Persistence

Necko

Spider-Monkey

Expat

GTK+ Adapter

Security (NSS/PSM)

JavaScript Interpreter

XML Parser

GTK+ / X11 Libraries

Networking

Display Backend

User, Secure, & Engine Persistence
Figure 1 - Our derived conceptual architecture of Google Chrome
IE ARCHITECTURE

- **IExplore.exe**
  - Internet Explorer Application

- **ShDocVw.dll**
  - Web Browser Control

- **BrowseUI.dll**
  - User Interface

- **MSHTML.dll**
  - Trident
  - HTML/CSS Parser and Renderer
  - Document Object Model (DOM) and DHTML
  - ActiveDocument (DocObject)

- **URLMon.dll**
  - Security and Download

- **WinInet.dll**
  - HTTP and Cache
THE RENDERING ENGINE
Different browser use different rendering engines
THE BASIC FLOW OF RENDERING ENGINE

1. Parsing HTML to construct the DOM
2. Render tree construction
3. Layout of the render tree
4. Paint the render tree
1. HTML PARSER DOINGS

Parses input HTML tag
Fixes developer mistakes
Request to load resource
Constructs DOM tree
<!DOCTYPE html>
<html>
  <body>
    <p>SangBui Website</p>
    <div>
      <img src="home.jpg"/>
    </div>
  </body>
</html>
<!DOCTYPE html>
<html>
  <body>
    <p>SangBui Website</p>
    <div>
      <img src="home.jpg"/>
    </div>
  </body>
</html>

Parsing HTML to construct the DOM
2. RENDER TREE CONSTRUCTION

- Tree of visual elements in display order.
- Style information, computed metrics
- Shadow DOM tree
3. LAYOUT THE RENDER TREE

What is Layout process?

• Calculation of geometry and position
• Flow based model (left-to-right, top-to-bottom)
• Coordinate system relative to top left coordinates
4. PAINTING

Go through the tree from the root
Global and Incremental paint

Painting order (CSS2):
– background colour
– background image
– border
– …

Changes style will cause restyle and repaint of the element. Changes of position will cause re-layout and repaint.
LOOK BACK THE BASIC FLOW!

- HTML
- CSS
- DOM Tree
- Style Rules
- Render Tree
- Layout
- Painting
WEBKITS main flow

Mozilla's Gecko
DIFFERENT BROWSER USE DIFFERENT RENDERING ENGINES IN DIFFERENT WAYS
WHY IT MATTERS
THE BETA TRADE IS WINDING DOWN

There are still plenty of opportunities for investors to tap in emerging markets. However, the traditional beta trade—a top-down, broad-based approach to investing—will likely be much less effective. In the next phase of emerging-market growth, investors must be more discriminating.

THE TAKE-AWAY
DISTINCTIONS MATTER MORE TODAY

For investors, opportunities and risks won’t turn up in the obvious places, such as winners of the commodity boom or those affected by high-level economic trends. Investors will need to make clearer distinctions between countries, companies and thematic opportunities.
<!DOCTYPE html>
<html>
  <body>
    <img src="home.jpg"/>
    <p>TVNClub</p>
    <div>
      <p>Browser Architecture</p>
    </div>
  </body>
</html>
CROSSING BROWSER TESTING

• Cross browser testing is a process to test the web application across multiple browsers.

• Check compatibility of web in multiple browsers & make sure that web application works correctly.

• Involves testing both client side and server side behavior of application.
TEST THE WEB APPLICATION ACROSS MULTIPLE BROWSERS?
EXHAUSTIVE TESTING

Exhaustive Testing (Test everything) is Impossible. Instead of exhaustive testing, Risk analysis and Priorities should be used to focus testing efforts.

Based on:
- Know your audience
- Decide the platform you will support
- How much you can test
- Trending
TRENDING

StatCounter Global Stats
Top 9 Desktop, Mobile & Tablet Browsers in Viet Nam from Feb 2015 to Feb 2016

- Chrome: 40.73%
- Coc Coc: 15.15%
- Safari: 12.12%
- Firefox: 9.58%
- IE: 7.08%
- Android: 4.47%
- IEMobile: 3.74%
- Opera: 2.67%
- UC Browser: 2.33%
- Other: 2.13%
StatCounter Global Stats
Comparison in Viet Nam from Feb 2015 to Feb 2016

- Desktop: 69.2%
- Mobile: 26.7%
- Tablet: 4.1%
<table>
<thead>
<tr>
<th>DotQA Test by Hanoi - Design &amp; Functionality</th>
<th>Date</th>
<th>Person</th>
</tr>
</thead>
<tbody>
<tr>
<td>Win7-Chrome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Win7-FireFox</td>
<td></td>
<td></td>
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<tr>
<td>Win7-IE8</td>
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<td></td>
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<td>Win7-IE9</td>
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<tr>
<td>Mac-Safari</td>
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<td>Mac-FireFox</td>
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<tr>
<td>Mac-Chrome</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Samsung Galaxy S5 - Android 4.4.2</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iPhone 6 - iOS 8.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iPhone 6 Plus - iOS 8.1</td>
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<tr>
<td>Black Berry Bold - BlackBerry OS 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Surface - Windows 8</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iPad Air - iOS 8.1</td>
<td></td>
<td></td>
</tr>
<tr>
<td>iMac - OS X 10.9.4</td>
<td></td>
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</tr>
</tbody>
</table>
HOW TO SET UP A ENVIRONMENT

VirtualBox: Modern.ie:
(Support IE6 – MS Edge)
https://www.virtualbox.org/wiki/Downloads
https://dev.modern.ie/tools/vms/windows/

IE Tab: Chrome & Firefox. Support IE 7,8,9

Tools:
• www.browseemall.com
• https://crossbrowsertesting.com
• https://saucelabs.com
• https://www.browserstack.com
SAFARI BROWSER
Thống kê trình duyệt sử dụng ở Việt Nam

Các thống số bên dưới là thống kê ở thị trường Việt Nam trong một năm qua (tháng 02/2015 - tháng 02/2016) trên Desktop - Mobile - Tablet.

Tỉ lệ các trình duyệt được sử dụng.
How to setup this requirements:

Chrome latest
Chrome 46
Chrome 44
Firefox latest
Firefox 45
Firefox 43
Firefox 42
IE Edge
IE 11
IE 10
Safari latest
Android browser latest
Chrome latest
Firefox latest
IE Edge
Android browser latest

Chrome 46
Firefox 45
IE 11

Chrome 44
Firefox 43
IE 10

Safari latest
Firefox 42
CHECK SUPPORTED CODE

http://fmbip.com/
http://www.browseemall.com/Compatibility/ValidateHTML
https://www.browseemall.com/Resources
https://html5test.com/
https://html5test.com/compare/browser/index.html
Hey! Wake up.
CLIENT VALIDATION

Sign up

Email is not valid

* Email
  abc

* Password

* Password confirmation

File Upload Form

File size should be less than 100000 byte.

Name: Choose File
no file selected

Upload File

localhost:3000/users/sign_up
CLIENT SIDE TESTING

Client-Side testing is concerned with the execution of code on the client, typically natively within a web browser or browser plugin.
BYPASS CLIENT-SIDE

• Disabling JavaScript in the browser
• Using a browser tool (ex: Firebug)
• Using a proxy tool like WebScarab or Tamper Data to intercept any submitted data and manipulate it before sending it on to the server.
PRACTICE ISSUES

- HTML input required Attribute
- HTML input maxlength Attribute
- Check upload file format
- Check locked/security content

http://www.w3schools.com/tags/tryit.asp?filename=tryhtml5_input_required

http://www.w3schools.com/tags/att_input_maxlength.asp

http://demo.byonepress.com/premium/sl-wp/
TAMPER DATA

“PLAY WITH THE CLIENT-SIDE”
REFERENCES

http://www.lxway.com/599268602.htm
http://taligarsiel.com/Projects/howbrowserswork1.htm
http://sangbui.com/thong-ke-trinh-duyet-su-dung-o-viet-nam/
http://blog.kloud.com.au/2014/05/02/cross-platform-testing-myths-vs-mysteries/
https://www.owasp.org/index.php/Client_Side_Testing
THANK YOU

Q&A