

Server Filter for Mobile Devices

CPET491 Senior Design Project Phase II
Submitted to Professor Paul Lin
Submitted by Don Ohlwine
Advisor: Professor Paul Lin
Project sponsor: In My View, LLC

1

Abstract

- Today's modern cell phones (smart phones) and tablets are in fact mobile web devices.
- Many websites are formatted for desktop computers.
- New approach to solving formatting problems, combine server side processing with Cascading Style Sheets (CSS).

2

Contents

- Introduction
- System Design
- Software Design
- Unit Testing and System Integration
- Project Management
- Conclusion

3

Introduction

Introduction, Problem Statement, Example of Poor Formatting, Back Ground, Primary Purpose, Overview

4

Introduction

- This report is organized with a discussion of the problem to be solved, system design, software design, testing and integration, project management, and a conclusion.
- Graphics which may not display well during the presentation are included in the Appendix.

5

Problem Statement

- In 2014, the use of mobile devices to access the internet became greater than fixed (e.g. desktop computer) internet access [1].
- There is one issue which often plagues users of mobile platforms which is visiting websites which are difficult to view.
- Many websites attempt to maintain separate webpages for mobile devices which are tailored to the smaller form factor.

[1] Danyl Bosomworth (2015). "Mobile Marketing Statistics 2015." Smart Insights [Online]. Available: <http://www.smartinsights.com/mobile-marketing/mobile-marketing-analytics/mobile-marketing-statistics>

6

Example of Poor Formatting



7

Background

- Dealing with formatting webpages for mobile devices is not a new issue and has become more important as the number of mobile devices increases.
- To achieve better viewing of the webpages content, the type of device visiting the website needs to be detected.
- The goal of this project is to dynamically format the content of a website to match the screen of the requesting device.

8

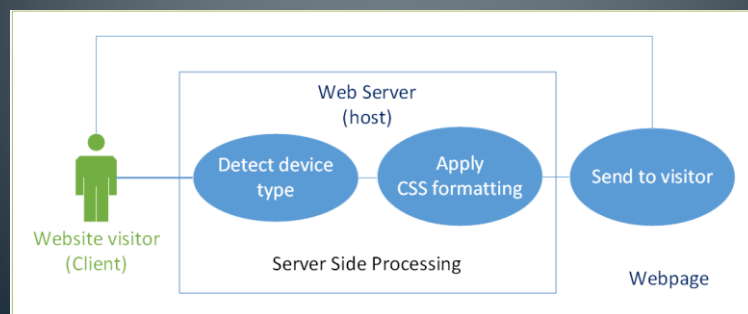
Primary Purpose

- The goal of this project is to dynamically format the content of a website to match the screen of the requesting device thereby:
 - Reducing labor and maintenance cost for website.
 - Improved experience for site visitors.

9

Overview

- The goal of this project is to dynamically format the content of a website to match the screen of the requesting device (client).
- The Server Filter for Mobile Devices demonstrates a two pronged approach to solving the issue of dynamically formatting of webpage content.



10

System Design Overview

E-commerce Site Development, Apache Hosted Website, Software Development Environment, Microsoft Expression Web 4, CSS File definitions, and Scope

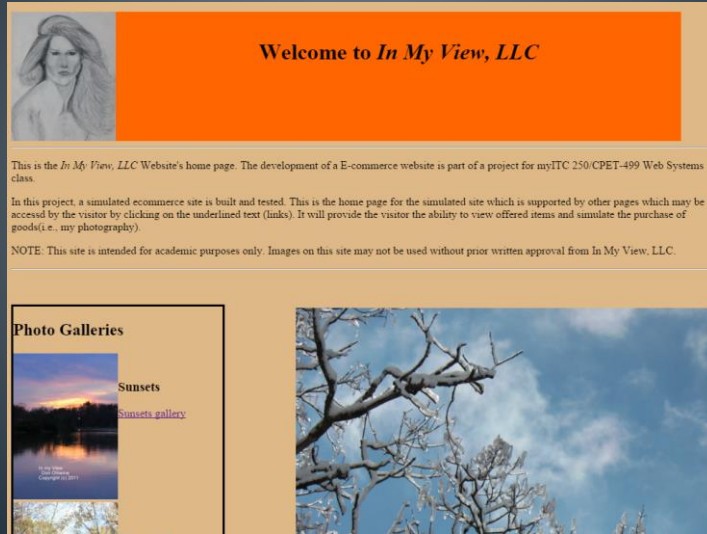
11

E-commerce Site Development

- The development of E-commerce site to be used as a controlled test site was originally completed as part of a project for a previous class ITC250/CPET499, Web Systems.
- The site was developed using the Microsoft Expression Web 4 application and was hosted on an Apache server on a desktop computer.
- The “In My View, LLC” (www.inmyviewllc.com) website currently serves as a test site for the Server Filter for Mobile Devices project.
- Following is a screen capture of the website.

12

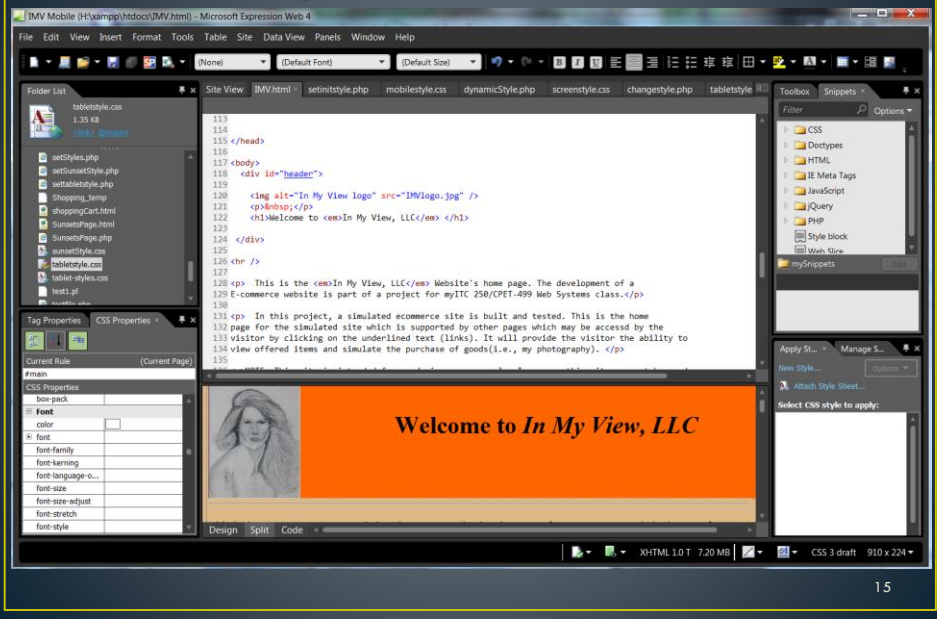
Apache Hosted Website



Software Development Environment

- The research for and the choosing of a software development environment consisted of a comparison between NetBeans and Microsoft Expression Web 4.
- The Microsoft Expression Web 4 application which is a software Integrated Development Environment (IDE) was chosen because it supports the development of:
 - Scripts in PHP
 - Scripts in JavaScript
 - Scripts in other languages (Ajax, Perl, etc.)
 - Webpages
 - Cascading Style Sheet files

Microsoft Expression Web 4



CSS File Definitions

- The creation of three CSS “styles” files, one each for the mobile, tablet, and screen devices are used for the dynamic application of a style to a webpage.
- The following shows the relationship between device type and CSS file used.
 - mobileStyle.css – Smart phones, Personal Digital Assistants, or other devices with screen widths of 960 pixels (px) or less.
 - tabletStyle.css – Tablets, iPads, and iPods with screen widths more that 960px and less than 1200px.
 - screenStyle.css – Desktop and Laptop computers with screen widths greater than 1200px.

Scope

- Modify existing website to use new “Mobile Filter” application.
- Integrate server side mobile device detection with dynamically applied formatting using CSS.

17

Software Design

Filter Design, Flow Diagram, Website Hosting, Remote Hosting, Remotely Hosted Website, Subdomain, and CSS “Screen Style”

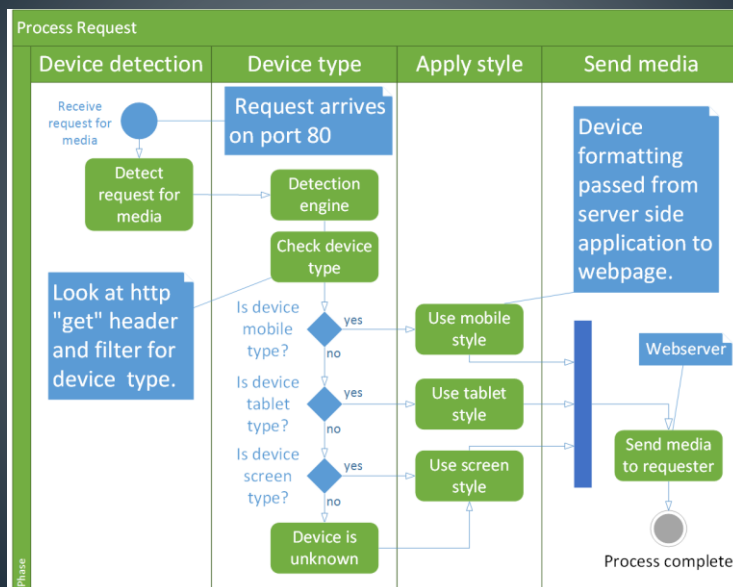
18

Filter Design

- The design of the filter requires checking the HTTP header.
 - “User-Agent” portion of the request (or “Get”) header is tested.
 - The information is used determine the device type.
- Once the device type is decided, the type is passed to the formatting section where the associated CSS format is applied.
- See the flow diagram on the following slide.

19

Filter Flow Diagram



20

Website Hosting

- The purchasing of a domain through Arvixе has enabled the In My View LLC site, www.inmyviewllc.com to go online.
- Webhosting sites which were compared:
 - Arvixе
 - InMotion
 - JustHost
 - HostGator
 - BlueHost
 - GoDaddy
- Features compared:
 - Price
 - Type of servers
 - Number of domains
 - Number of email addresses
 - Support
 - Disk space
 - and site builder tools

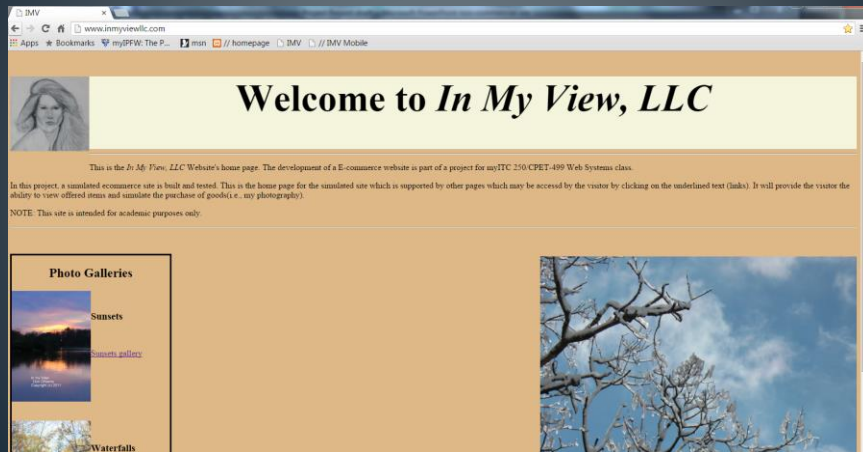
21

Remote Hosting

- To facilitate realistic testing of the design features, the site needed to be remotely hosted.
- The cost of the webhosting service is \$7.00 per month which includes:
 - Domain name registration for up to six domains
 - 100 email addresses per domain
- The following is a screen capture from the homepage of the In My View LLC Website.

22

Remotely Hosted Website



23

Subdomain

- A subdomain has been created to enable side by side comparison of a site with and without the filter application.
- Note the use of the mobile-styles.css format on the subdomain www.mobile.inmyviewllc.com

24

CSS “Screen Style”



25

System Testing

Software Testing, Chrome's Developer Tools, System Integration, Baseline Data Collection, Evaluation, System Requirement Modification

26

System Testing

- Two sites are identical with the exception of the homepage HTML file.
- This enables a side by side comparison between a “regular” site and one with the filter application.
- Hosting the sites on a remote Webhost provides a “real world” environment in which data can be collected.
- The Developer Tools found in the Chrome browser allows the following:
 - Selection of different device types (e.g. mobile phones, tablets, and laptops)
 - Records and displays information about the items downloaded when you click on a website

27

Chrome's Developer Tools

The screenshot displays the Chrome Developer Tools interface. The main pane shows a simulated website titled "Welcome to In My View, LLC". The website content includes a header with a logo and text, a paragraph about a simulated E-commerce site, and a "Photo Galleries" section with images of sunsets and waterfalls. The right-hand pane shows the "Network" tab, which lists the resources loaded by the page. The table below represents the data shown in the Network tab:

Name	Status	Type	Initiator	Size	Time	Timeline - Start
www.mh...	200	document	HTML	2.6	261 ms	
300x300.jpg	304	image	css	26	158 ms	
300x300.jpg	304	image	css	26	164 ms	
Cropped-3...	304	image	css	26	160 ms	
300x300.jpg	304	image	css	26	162 ms	

At the bottom of the Network tab, it shows: 5 requests | 3.0 KB transferred | Finish: 404 ms | DOMContentLoaded: 265 ms. The Console tab is also visible at the bottom, showing "Emulation: Rendering" and "Preserve log".

28

Baseline Data Collection

- The collection of data to form a baseline of performance is critical to evaluate the success of this project.
- To gather quantifiable data, the Chrome browser's Developer Tools provides data on file size, files downloaded, and time required for downloading a webpage.

29

Evaluation

- A sample copy of a Website Download Evaluation summary is found in Appendix B.

30

System Requirement Modification

- The project has evolved to include device detection/filtering and system testing using a remote host site running a Linux server.
- This change affects the expected outcome and therefore the System Requirements need modification to reflect the new direction.
- See Appendix C for the proposed changes to the System Requirements.

31

Project Management

Schedule, Cost, Problems Encountered, Lessons Learned

32

Schedule

- The following task were completed:
 - On time - Website design, Research of SDE/IDE, Design and Coding of Filter Software, Start of Testing and Debugging, Project Presentation, and Project Report.
 - Late (but prior to the project end date) – Testing, Debugging, Verification, and Change Log Update.
- Integration of Radio Button function or the device filter to the remote server was not completed.
- See Gantt Chart in Appendix A

33

Cost

- The actual cost for the program was:
 - **Material Costs (est.):** **\$374**
 - **Tool Costs (est.):** **\$200**
 - **Labor Hours – Project Team (est.):** **325**
- The use of Freeware, student version of software applications, and open source applications greatly reduced cost to the program.
- Project cost would have exceeded **\$4918.95**, if purchased new.
- Remote Webhosting was not an expected cost.
 - Inexpensive - \$134.00 total for two years plus domain name
 - Impacted schedule

34

Problems Encountered

- Definition of device types is complicated by new features and screen resolutions of smart phones.
- The integration of PHP scripts into remotely hosted websites.
- System Requirements did not reflex change in scope.

35

Lessons Learned

- Limit and or avoid scope changes.
- CSS 3 used properly “fixes” many formatting issues.
 - Not all browsers recognize new CSS 3 features
 - Converting old sites to new standard is often very labor intensive
- Not having full access and administrative rights to your server can make resolving issues difficult.
 - PHP parsing
 - Technical support

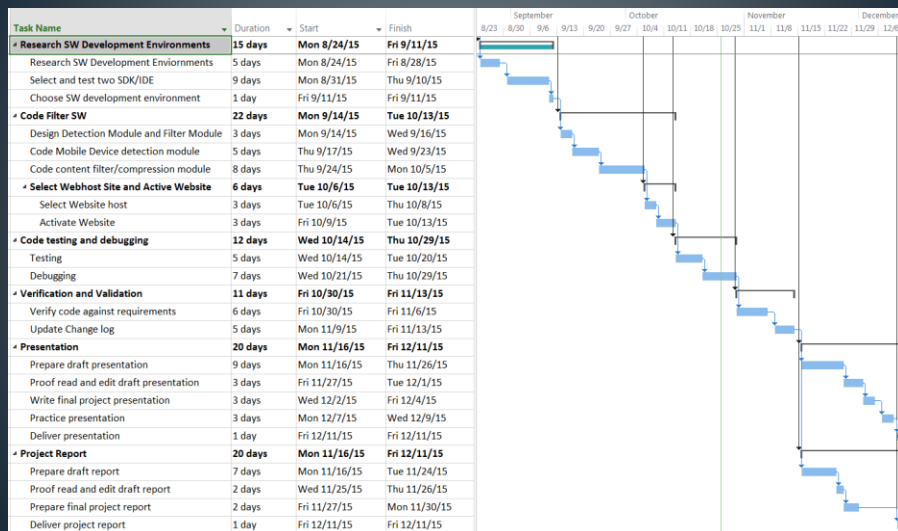
36

Appendixes

A, B, C

37

Appendix A: Gantt Chart



38

Appendix B: Evaluation

Website Download Evaluation							
Device		Download					
Device	Device Type	Number of files	Size (bytes)	Time (ms)	Site	Date	Comments
iPhone 4	mobile	3	458	276	www.inmyviewllc.com	10/18/2015	
iPad Mini	tablet	3	459	261	www.inmyviewllc.com	10/18/2015	
Gallexy III	mobile	3	458	274	www.inmyviewllc.com	10/18/2015	
Laptop	screen	3	458	283	www.inmyviewllc.com	10/18/2015	

Appendix C: System Requirement Change List

Rev	Date	Author	Change(s)	Comments
1	26-Oct-14	Don Ohlwine	2 of each requirement type were entered.	Initial Draft
2	27-Oct-15	Don Ohlwine	ID 4 changed from "...shall detect "Accept-Encoding" browser support."	Update to reflect change in focus
			to "...shall detect device type from HTTP User_Agent field of "get" request."	
3	27-Oct-15	Don Ohlwine	ID 10 change "shall" to "may".	Update to reflect use of Linux server on Webhost.
4	27-Oct-15	Don Ohlwine	ID 11 change "may" to "shall".	Update to reflect use of Linux server on Webhost.