LOCATION BASED INTERACTIVE LEARNING TOOL ON LIFE

HISTORY OF MIDGE COSTANZA

A Thesis
Presented to the
Faculty of
San Diego State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Science
in
Computer Science

by
Melroy Mathew D’Monty

Fall 2012
SAN DIEGO STATE UNIVERSITY

The Undersigned Faculty Committee Approves the

Thesis of Melroy D’Monty:

Location Based Interactive Learning Tool on Life History of Midge Costanza

Carl Eckberg, Chair
Department of Computer Science

William A. Root
Department of Computer Science

Doreen Mattingly
Department of Women’s Studies

Date July 2012
Approval Date
Copyright © 2012
by
Melroy Mathew D’Monty
All Rights Reserved
DEDICATION

This thesis is dedicated to my parents, Mathew D’Monty and Agnes D’Monty and all my family who have raised and guided me to always be a better person in all walks of life.

To my brother, Amron D’Monty, my cousins, Nester D’Monty, Delphina D’Monty, Pramila D’Monty, my nephews Nick, Seanan and my nieces Risa, Rincy, Sancia and Kim for providing me with unconditional love, affection and believing in me at all times.

To all my dear friends Aditi Laddha, Shilpi Priyadarshini, Gaurav Tyagi, Parita Shah, Chintan, Falgun, Pratik and Darshini who have always motivated me in this process.

To all my professors and computer science department who put in a lot of time and effort in order to make the learning process as smooth as possible.

Thank you all for being a part of my life and bringing me joy in the process.
ABSTRACT OF THE THESIS

Location Based Interactive Learning Tool on Life History of Midge Costanza
by
Melroy Mathew D’Monty
Master of Science in Computer Science
San Diego State University, 2012

The focus of this thesis is to create a GIS tool for the Department of Women’s Studies featuring the life history of Midge Costanza. This is a geographic computer interactive tool that will help students, learn about her journey, her deeds and show important events she participated in to provide a balanced dedication to human rights and her concern for communities. The students will be able to select different layers and click on a particular event or place to and see more information on a web page. It also enhances the student’s abilities to select videos, audios and pictures from the archive. This application can be customized according to individual interests. Also, a Quiz in the end will allow students to verify the things they learned about using this tool.

One of the biggest design challenges is to have the interface simple and capable of handling multiple tasks in real time without compromising the feature set. Subsequently, every attempt has been made to present a rich depth of subject knowledge through a lucid yet powerful Interface. The application is designed in JAVA and uses MOJO (Map Object Java Object), which is provided by ESRI. Using MOJO, GIS related features can be easily incorporated into the application by linking data to various geographical features on the map.

Using modern computer technology to present an important subject in an engaging and interesting fashion helps not only students to learn, but also the instructors who can handle bigger class sizes and provide content not readily available in standard texts with greater ease to teach. Also, the use of Internet and dedicated website would make the learning process even more vibrant and interactive with ease of access to the content from anywhere you go.
TABLE OF CONTENTS

ABSTRACT............................................................................................................................... v
LIST OF TABLES .................................................................................................................... viii
LIST OF FIGURES ................................................................................................................ ix
ACKNOWLEDGEMENTS ......................................................................................................... xi

CHAPTER

1 INTRODUCTION ......................................................................................................... 1
  1.1 Summary ............................................................................................................ 1
  1.2 The Application ................................................................................................. 2

2 TECHNOLOGY ............................................................................................................ 4
  2.1 Why JAVA? ....................................................................................................... 4
    2.1.1 Genesis ..................................................................................................... 4
    2.1.2 Feature Set ............................................................................................... 5
    2.1.3 Versions ................................................................................................... 6
  2.2 Map Objects Java Edition .................................................................................. 7

3 REQUIREMENTS ......................................................................................................... 8
  3.1 Data Requirements ............................................................................................. 8
  3.2 Platform Requirements ...................................................................................... 9
  3.3 Functional Requirements ................................................................................... 9
  3.4 End-User Requirements ..................................................................................... 9

4 WHO WAS MIDGE COSTANZA? ............................................................................ 11
  4.1 Childhood ......................................................................................................... 11
  4.2 Early Life and Entry into Politics .................................................................... 11
  4.3 Congressional Aspirations .............................................................................. 12
  4.4 Woman in White House .................................................................................. 12
  4.5 After White House .......................................................................................... 14
  4.6 Death ................................................................................................................ 15
  4.7 Honors .............................................................................................................. 16
5 PROTOTYPE ..........................................................................................................................17
6 SOFTWARE ARCHITECTURE ...............................................................................................21
7 NETBEANS IDE AND MAPOBJECTS CONFIGURATION ...........................................23
8 MAP OBJECTS TOOLBARS AND BUTTONS .................................................................30
  8.1 ZoomPan Tools ...........................................................................................................30
  8.2 Layer Toolbar ...........................................................................................................30
  8.3 Selection Toolbar ......................................................................................................31
  8.4 Measuregeocode Toolbar ......................................................................................33
  8.5 Custom Buttons .......................................................................................................33
    8.5.1 Print ..................................................................................................................33
    8.5.2 Arrow ...............................................................................................................34
    8.5.3 Identify ..............................................................................................................34
  8.6 Co-Operation Display .............................................................................................34
9 PROJECT LAYERS ...........................................................................................................35
  9.1 Feature Layers ........................................................................................................35
  9.2 CSV Files ................................................................................................................38
10 SCREENSHOTS .............................................................................................................39
11 CONCLUSION AND OBSTACLES ............................................................................44
12 FUTURE ENHANCEMENTS .........................................................................................45
BIBLIOGRAPHY ................................................................................................................46
LIST OF TABLES

Table 8.1. ZoomPan Tools .......................................................................................................31
Table 8.2. Add/Delete Tools ....................................................................................................32
Table 8.3. Selection Tools .......................................................................................................32
Table 8.4. Measure Tools .........................................................................................................33
Table 8.5. Custom Buttons .......................................................................................................34
# LIST OF FIGURES

<table>
<thead>
<tr>
<th>Figure</th>
<th>Description</th>
<th>Page</th>
</tr>
</thead>
<tbody>
<tr>
<td>5.1</td>
<td>Start screen.</td>
<td>18</td>
</tr>
<tr>
<td>5.2</td>
<td>GIS tool – Midge Costanza’s life history.</td>
<td>18</td>
</tr>
<tr>
<td>5.3</td>
<td>Quiz.</td>
<td>19</td>
</tr>
<tr>
<td>5.4</td>
<td>About box.</td>
<td>20</td>
</tr>
<tr>
<td>6.1</td>
<td>Software diagram.</td>
<td>21</td>
</tr>
<tr>
<td>7.1</td>
<td>NetBeans - library manager.</td>
<td>24</td>
</tr>
<tr>
<td>7.2</td>
<td>NetBeans - new library.</td>
<td>24</td>
</tr>
<tr>
<td>7.3</td>
<td>NetBeans - library manager with new library.</td>
<td>25</td>
</tr>
<tr>
<td>7.4</td>
<td>NetBeans browse JAR folder.</td>
<td>26</td>
</tr>
<tr>
<td>7.5</td>
<td>NetBeans - palette menu.</td>
<td>26</td>
</tr>
<tr>
<td>7.6</td>
<td>NetBeans - palette manager.</td>
<td>27</td>
</tr>
<tr>
<td>7.7</td>
<td>NetBeans - install components to palette.</td>
<td>28</td>
</tr>
<tr>
<td>7.8</td>
<td>NetBeans - select palette components.</td>
<td>28</td>
</tr>
<tr>
<td>7.9</td>
<td>NetBeans - palette category selection.</td>
<td>29</td>
</tr>
<tr>
<td>8.1</td>
<td>MapObjects - toolbar.</td>
<td>30</td>
</tr>
<tr>
<td>8.2</td>
<td>MapObjects – ZoomPan toolbar.</td>
<td>30</td>
</tr>
<tr>
<td>8.3</td>
<td>MapObjects - add/delete toolbar.</td>
<td>31</td>
</tr>
<tr>
<td>8.4</td>
<td>Selection toolbar.</td>
<td>32</td>
</tr>
<tr>
<td>8.5</td>
<td>MeasureGeocode toolbar.</td>
<td>33</td>
</tr>
<tr>
<td>9.1</td>
<td>Main page for the tool.</td>
<td>36</td>
</tr>
<tr>
<td>9.2</td>
<td>Page identifying life before white house, where Midge ran for the title of Mayor</td>
<td>36</td>
</tr>
<tr>
<td>9.3</td>
<td>Preview for the points depicting Midge’s life while in White House.</td>
<td>37</td>
</tr>
<tr>
<td>9.4</td>
<td>Life after White House in San Diego.</td>
<td>37</td>
</tr>
<tr>
<td>9.5</td>
<td>CSV file depicting the information for the shape file.</td>
<td>38</td>
</tr>
<tr>
<td>10.1</td>
<td>Home page for the website</td>
<td>39</td>
</tr>
<tr>
<td>10.2</td>
<td>Pictures page of the website</td>
<td>40</td>
</tr>
<tr>
<td>10.3</td>
<td>Videos page of the website</td>
<td>40</td>
</tr>
</tbody>
</table>
Figure 10.4. Maps page of the website .................................................................41
Figure 10.5. Report page of the website .............................................................41
Figure 10.6. Quiz page of the website ...............................................................42
Figure 10.7. About page of the website .............................................................42
Figure 10.8. Contact page of the website .........................................................43
Figure 10.9. Help page for the tool .................................................................43
ACKNOWLEDGEMENTS

I’d like to thank Dr. Carl Eckberg, my thesis advisor and Chair, for providing an opportunity to work on thesis project along with his guidance and extended support.

I would also like to thank Dr. Doreen Mattingly for providing me with all the information about Midge Costanza and guiding me through this process.

Also, I would like to express my deepest gratitude towards Prof. William Root for being an integral part of my thesis committee.

I would not have been able to do this without the help of the aforementioned people. Special thanks to Computer Science Department for providing me with the tools and venue for my defense presentation.
CHAPTER 1

INTRODUCTION

1.1 SUMMARY

Change is the only constant. Isaac Asimov

Often it has been proven that the best way to move ahead successfully over time is to accept change and move with it; technology is no exception. We can choose to ignore the change and wish for it to go away or embrace it, the later being the better option. One of the important sectors where technology has shown its effect is education and learning. Another unavoidable fact is the growing interests of businesses in having computer technologies as a requirement.

“Meet them where they live!” incorporates a solid undercurrent of wisdom. Internet and computer technologies have engulfed our lives, since their first inception a decade ago [1].

It is already woven into the fabric of lives of millions of people around the world. Many people, especially students, are already using tech on a regular basis. For centuries the traditional means of learning has been through books and classrooms. Using technology and Internet aided tools in classrooms can help the teacher talk to students in their language. Tools available today, to name a few, Blackboard, wiki, collaborative tools, have already made it easier to dissipate information to a wider audience. E-Learning has seen a tremendous popularity in the past few years and rightfully so, as it provides an immediate approach with the least amount of work [1].

My work, as an educational tool, in its entirety focuses on E-Learning. The aim behind this tool is to portray the life history of late Midge Costanza, a strong assistant to president Jimmy Carter, in hope of helping students understand about Midge and her fight for different causes. This is achieved by providing students with a very animated and interactive tool, with the help of pictures and videos. It also incorporates a graphical map layout, which is spontaneously interactive and engaging. This tool, married to a website, provides a very
easy and interesting manner of approach to learning and is far more appealing to students who are already accustomed to this environment. And for those who have yet to accept the technology, it may be a place to start. With various features like layers, coordinate location and map points, students will be able to learn chronologically and quickly and their knowledge about the underlying topic can be tested through an online test monitored by the professor with minimal effort.

1.2 THE APPLICATION

The geographic approach has ways of helping us better understand human activities. This approach allows us to design, plan and change our world by measuring earth distances, organizing this data and analyzing and modeling various processes. With this ability to inquire, acquire, examine and analyze the data, we are able to solve problems and share it easily. At the heart of this process lies the ‘GIS Geographic Information System,’ that integrates hardware, software and data manipulation and displaying geographically referenced information. There are various advantages to GIS including but not limited to cost saving, increased efficiency, improved communication and better management. Another great advantage to GIS is, integration into any enterprise's system framework, in our case education, helping students meet the demands irrespective of their field of interest [2].

ESRI is the company that enables organizations to create responsible and sustainable solutions to problems with the aid of GIS. This application is developed using one of the many ESRI enabled technologies, Map Objects Java Edition. With the help of MOJO (Map Objects Java Objects) we are able to incorporate images supporting a variety of formats such as BITMAP, TIFF, PNG and JPEG. We are also able to include vector-based files such as Shapefiles that store geospatial vector data. Shapefile is an open standard regulated by ESRI, for data interoperability among ESRI products that describe various geometrics. This tool is designed with the help of NetBeans IDE 7.2, and written in the JAVA Programming Language pooled with MOJO.

This thesis document is a collaborative effort encompassing the information and help provided by Dr. Carl Eckberg, Dr. Doreen Mattingly and Dr. William Root, divided into various subsections including the workings of the tool, development procedure, life history of Midge Costanza to whom this tool is dedicated and various other features. A general
walkthrough of the information expected form this document, roughly characterized into SDLC phases, follows.

The first few chapters concentrate on the information gathering and analysis part where we discuss about the change in times and technology and the need for this tool. We analyze the requirements and try to determine the best possible scenarios for our tool to function in.

Following the analysis we setup the design for the tool and try to determine the architecture and flow of data and the interaction between all the modules including the IDE and MOJO. We also determine the various things to be included in the tool to make it easier to use and navigate through the tool.

The final few chapters discuss the details about the implementation of the tool and overall look and feel of the tool in its completion. Although this tool is nowhere near perfect, I’ve tried my best to make it as easy to use and understand as possible. We also conclude on some of the challenges faced during the implementation of this tool along with shortcomings and present some future enhancements.
CHAPTER 2

TECHNOLOGY

The tool has been designed using JAVA and ‘MOJO: Map Objects Java Objects’ a pair of technologies that lets us create, tools like this one, with ease and flexibility that no other paired or individual program can provide while keeping it Open Standard. Each of the following sections will explain in great detail, various reasons for choosing individual technologies.

2.1 WHY JAVA?

JAVA as we know today has evolved into various threads, spawned of a single parent process, which truly owes its origins to C and C++. Java was intentionally designed to have the characteristics of C and C++, echoing the object-oriented characteristics of C++ and appealing to an existing brigade of programmers following C/C++. Although, it somewhat resembles C/C++, it’s nowhere near similar to its antecedents. The key factors separating Java and C/C++ are its ability to be easy deployment and portable irrespective of the platform.

2.1.1 Genesis

“OAK,” as it was initially known was the first working iteration of Java conceived at Sun Microsystems, Inc In 1991. The key members contributing to the development of initial version of JAVA were James Gosling, Patrick Naughton, Chris Warth, Ed Frank, and Mike Sheridan. Since it’s first inception Java developers became aware of the growing focus on the Internet applications, providing with an architecture neutral programming language, that led to a huge success. Later during it’s revision for the public release, many more people contributed including, Bill Joy, Arthur Von Hoff, Jonathan Payne, Frank Yellin, and Tim Londholm, that helped in maturing from the original version [3].
2.1.2 Feature Set

JAVA has various tricks up it’s sleeve that makes it one of the most widely used and popular language. Some of the native features are [3]:

- **Applets:** Applets are designed to be executed on the client side with information provided from the server and carry out interaction based on the user input.
- **Servlets:** Like applets, servlets dynamically extend the functionality of the web browser but run on the server side. With the introduction of servlets client / server integration was complete.
- **Byte Code:** One of the key concerns with the applet/servlets approach was the automatic download and execution of the code, which could result into security issues. This problem was resolved by the introduction of byte code. Byte Code is the output of compilation of Java code, which is composed of a highly optimized set of instructions designed to be executed by JVM - Java Virtual Machine, an interpreter for the byte code. Since byte code is interpreted by JVM, the end user system is more secure since the code does not have access outside JVM. Since JVM is the only thing that’s platform specific, code can be compiled once and then executed on any platform suitable for JVM. This largely helped address the ever-important issue of portability.

Although previously mentioned features made JAVA possible, various other features also played an important role in shaping JAVA and make it suitable for real world challenges. All of these buzzwords are listed below [3]:

- **Simple:** Since JAVA was based on C/C++ the syntax and some features remain familiar, which help learning JAVA an easy task.
- **Secure:** As we already discussed, JAVA is highly Secure thanks to the highly optimized instruction set called Byte Code and restricted access. Garbage collection affords considerable safety from runtime failure.
- **Architecture Neutral and Portable:** JAVA remains highly portable due to clever implementation of JVM, which executes the byte code.
- **Robust and Dynamic:** To make JAVA portable and avoid runtime failures, Java was designed to be a strictly typed language, checking your code better at compile time and resulting in close to perfect runtime code. In the wake of maintaining robustness, small fragments of byte code are altered dynamically at runtime. Java provides checking exceptions which provides added security against runtime failures.
- **Multithreaded:** Java was designed to address many challenges, one of which was the ability to achieve multiprocess synchronization, which was achieved by multithreaded programming.
- **Interpreted:** As opposed to the traditional approach of complier based execution, JAVA implements Interpreter based execution of code and even provides on-the-fly compilation of byte code into native code.
• Performance: Since the Java Byte code is highly optimized, it loses little to no performance even when ported to any other system, with the help from JIT Compiler.

• Distributed: With the help of RMI and ability to handle TCP/IP requests, Java is able to handle the distributed environment as well.

• Object - Oriented: Object Oriented approach in Java is able to strike a balance between the purist and pragmatist model by keeping it simple and easy to extend, while keeping the primitive data types as high-performance non-objects.

• Ease of distribution: By means of executable jar files, a complex application like this one can be packaged and executed in a single, uniform way.

2.1.3 Versions

Although the first version of JAVA was a major breakthrough in itself, the innovation did not stop there. Java as we know of today is at the seventh major version of its release history and includes far more features, changes to the API and newer packages with newer classes and methods. Java developer community has always kept on the innovation streak with initial inclusion of applets, servlets, byte code, JVM and so on. Some of the key and new technologies that help JAVA push the envelope are listed below [4]:

• Java Runtime Environment: JRE is a package that provides the libraries that enable automated exception handling, debugging, JVM along with the standard class libraries that implement the Java API (Application Programming Interface).

• Java Micro Edition: JME or J2ME provides an environment, which deals with the constraints such as limited memory, screen size, power capacity, of building applications for small devices.

• Java Bean: Java Bean defines an architecture that define how different building blocks, either provided by you or different vendor, operate together allowing you build complex systems from software components. Some of the key advantages of Java Bean are reusability and interoperability.

• Abstract Window Toolkit: AWT provides a basic set of controls; windows and dialogs that help you define the GUI or Graphical User Interface. Although originally not included, is now a part of Java foundation classes.

• JAVA Swing: Swing is outcome of efforts to tackle the deficiencies of AWT. Since the look and feel provided by AWT was platform dependent rather than Java code, there was always a possibility that the GUI looked and behaved different on different platforms. AWT Components therefore were named heavyweight. Swing is based of AWT and is not a replacement but rather an enhancement. Swing follows a Model-Delegate Approach with following key advantages [5]:

• Lightweight: Lightweight in these terms mean efficient and flexible. Since it is entirely controlled by Java and not the platform they can be controlled to a much greater extent, providing consistency across all platforms.
• Pluggable: Since swings supports PLAF - Pluggable Look And Feel, the look and feel of each component is rendered independently of it’s functionality. Therefore it is totally possible to make the look and feel of GUI consistent or varied based on the requirements rather than underlying operating systems. In our tool we’ll be using Swing to provide consistency and efficiency.

2.2 Map Objects Java Edition

Map Objects Java Edition is a toolkit of powerful pure Java components that allows developers to create client / server side, standalone or web based applications with support for projections, datum transformations, layers, spatial and attribute queries and numerous other features. It adheres to the Java standards and works both with J2SE and J2EE Environment. It is an independent solution and works without the necessity of other ESRI products but can also be coupled with them to provide an enterprise solution. There are various advantages to using the Map Objects Java Edition [2], [6]:

• Compatibility with wide range of Operating Systems.
• Compatibility with variety of data types.
• Rapid development of User Interfaces.
• Ability to combine data from various Sources.
• Wide range of mapping and GIS functionality.
• Ability to deliver faster, cheaper and better integrated GIS data management solutions.
• Ability to integrate into various IDEs.
CHAPTER 3

REQUIREMENTS

This tool is developed for the Women’s Studies Department at San Diego State University, for students wanting to learn in depth about the life of Midge Costanza, who was a presidential advisor, social and political activist. Following the initial requirements, this tool is supposed to deliver an interactive environment for students while keeping it simple and easy to use. This tool incorporates data on three very distinctive but important levels.

- Date requirements: About Midge Costanza
- Platform requirements: System and Hardware requirements
- Functional requirements: User Interface requirements
- End User/ Educational requirements: Curriculum requirements

3.1 DATA REQUIREMENTS

Although most of the information pertaining to anyone famous individual is publicly available on the Internet, it cannot always be trusted. Despite being one of the pioneering people for many initiatives, not much has been written about Midge Costanza, nor is it readily available. All the data pertaining to the life of Midge Costanza, collected or extracted, has been carefully examined by Dr. Doreen Mattingly, who is authoring a biography of Midge’s career and political achievements and was also a friend and a favorite student of Midge Costanza. The data gathered was based upon following points:

- Family and childhood
- Schooling
- Early life and entry into politics
- Congressional aspirations
- Woman In white house
- After white house
- Death
- Honors
3.2 Platform Requirements

One of the reasons as already discussed for choosing JAVA over anything else was the ease of portability and platform independence. Therefore the tool developed will run irrespective of the platform. This tool however was designed and developed on Windows 7 with the help of NetBeans IDE and Map Objects Java Objects package. As far as the hardware requirements go, this tool can be run on any machine that is capable of running the JVM.

3.3 Functional Requirements

Functional requirements pertain to all things that are displayed and will be part of the tool. In order for this tool to be functionally appealing and easy to use, it has to follow certain guidelines. These guidelines provided by Dr. Eckberg, cover all the scenarios, behavior and actions that will be performed on the UI. Some of the primary functional requirements are as follows:

- A map displaying all the regions where Midge was active.
- The map should be able to display time period.
- When clicked, it should display geographic information related to the location/region.
- Each region/pin on the map should be hot linked.
- The hot links should direct the user to a web page with detailed information on the topic/region that was clicked, with the help of pictures and videos, if applicable.
- The website/webpage should also include all related information.
- It should, if possible, include a web-based map for all the users to have access from anywhere, in case the tool is not accessible.
- One of the requirements from the educational environment was to include some form of quiz that is easily manageable by a professor and accessible to students for grading and evaluation purposes.
- As a part of distribution, the tool should be easy to install and execute, with minimal effort.

3.4 End-User Requirements

The end-user in this case is a student, who uses this tool to understand in great detail about the life of Midge Costanza. It is very important to understand the requirements of the end-user, as he/she is the one who’ll be using the tool for the most part. User centric
requirements were carefully crafted by Dr. Mattingly in order to include most of the requirements that an end-user (student) might need. Some of them are listed below:

- The tool should be easy to understand and use.
- The tool should include all the relevant information.
- It should have hot links in order to navigate easily.
- The tool/website should be easy to manage for the instructor.
- Including practice quiz makes for a better learning experience and was considered as one of the primary requirements.
CHAPTER 4

WHO WAS MIDGE COSTANZA?

Human Dignity is a right, not a privilege, a right inherited at birth.

Midge.

4.1 CHILDHOOD

Margaret Costanza, who was nicknamed ‘Midge’, was born on November 28, 1932, in LeRoy, New York. Her Parents, Philip and Concetta (Granata) Costanza, emigrated from Sicily to upstate New York and entered into the sausage-making business. When she was 5 years old her family moved to Rochester [7].

4.2 EARLY LIFE AND ENTRY INTO POLITICS

After moving to Rochester, New York, Midge attended Public School #33. She graduated from East High School in 1950 and many years later received an honorary LLD from Framingham State College. After graduating from high school she took various clerical jobs to get started as her interest in politics grew. While looking for opportunities she took a job of administrative assistant to a Rochester real estate developer. It was through this job that she became involved in various community organizations.

Midge’s interest in politics surfaced when she volunteered on Averell Harriman’s campaign for governor in 1954. Midge officially entered politics in 1959 as an executive committee member of the 22nd Ward of Rochester. Rising through the ranks of Democrat Party and becoming the county executive director of Robert F. Kennedy’s Senate campaign in 1964, she managed the senatorial campaign in Monroe County and soon became the vice chairperson of the local Democratic committee.

Midge ran for an at-large seat on the city council in 1973. She became the first woman to be appointed as a city council member. Although it was traditional for the leading vote getter to be appointed Mayor, the council appointed a man to be a mayor and Midge as vice-mayor, a largely ceremonial position with little power. Following this discrimination, Midge was unhappy and decided to be a feminist. Former Mayor William A. Johnson said,
Ms. Costanza was a “natural politician” and noted, “Many may have wanted to see her become the first female mayor in Rochester” [8].

4.3 Congressional Aspirations

Following her success on the city council Midge was drafted to run for Congress. During her run for the United State House of Representatives in 1974, Midge received a surprising call from a little known governor of Georgia, Jimmy Carter, who was the chair of the Democrat Party Committee to elect people to congress. He offered to help her, but Midge failed to unseat the Republican incumbent, Barber Conable. Although she narrowly lost the race towards Congress, she made a great friend in Carter. “He impressed me so much, I told him, ‘Remember me if you decide to run for president. He did.’” she told The New York Times in 1978 [8].

4.4 Woman in White House

“The goal of all governments should be to create a social environment in which every person can reach their full potential,” said Midge. In 1976 when Georgia governor Jimmy Carter ran for the presidency of the United States, Midge served as the CO-chairwoman of his campaign in New York. Carter admired Costanza’s quick wit and straight forwardness, and asked her to second his nomination at the 1976 Democratic National Convention. After winning the presidency, Carter appointed Midge to the post of Assistant to the President for public liaison, moving into the office next door to the Oval office.

“The White House should be the President’s window to the Nation, It should be a place where the people can voice what they want, what they felt and what they need,” Costanza said. Her sharp tongue and irreverent sense of humor made the 5-foot-tall Ms. Costanza a popular speaker among the White House reporters and columnists. Costanza served as the very important previously missing link between a wide variety of groups including women, children, youth, LGBT, minorities, and the disabled. She was very outspokenly committed to women’s rights. She fought deeply for various issues including the passage of the Equal Rights Amendment, gay rights and social justice to minorities.

Following President Jimmy Carter’s support for the Hyde Amendment banning federal funds for abortion, Midge met with 40 other pro-choice appointees of the Carter administration, deeply opposing Carter’s position on the matter. Although Midge’s loyalty
was attacked following the protest, Midge earned respect and confidence from the pro-choice community with increased federal support for contraception. She also held a groundbreaking meeting in the White House about domestic violence, which resulted in the formation of the National Coalition on Domestic Violence. “I had just started working in the Carter Administration when this power package of a woman, strode up to me and said, ‘We're unique here,’” said Bob Burke, remembering Midge during her days at White House [9].

Midge facilitated various meetings between the White House and groups of lesser-acknowledged communities including a historic meeting on Friday 26th March 1977 of 14 LGBT activists, the first of its kind. Midge gained well-deserved respect from all those represented and others. This meeting, to name a few, briefed on nondiscrimination legislation that would prohibit discrimination based on sexual orientation in hiring, education and public accommodations. The late Jean O’Leary, the then CO-executive director of the National Gay Task Force, remembered Midge’s remarks: “This is the first time in the history of this country that a president has seen fit to acknowledge the rights and needs of some 20 million Americans. We are highly optimistic that it will soon lead to complete fulfillment of President Carter’s pledge to end all forms of federal discrimination based on sexual orientation.” Midge was featured on the cover of Newsweek in a story titled “Woman in the White House.” Following this historic meeting, IRS dropped its requirement for applying for tax-exempt status. The pressing needs of lesbians and gay men began to be responded to by the federal government.

Costanza’s activism about LGBT rights and her personal relationship with Jean O’Leary, led many to believe her reason to fight for this cause. Midge while fervently rejecting the notion, argued that her motives were solely based on her motivation to provide social justice. Midge wasn’t solely focused on gay rights but was also a strong advocate for women’ rights. She was very vigilant and fearless in commenting about what she felt right. A few months after the protest against president’s opposition regarding providing federal money to poor women seeking abortions, she became the first member of the White House staff to call for the resignation of Bert Lance, the director of Office of Management and Budget, then being accused of financial improprieties. Although self described qualities “a loudmouthed, pushy little broad,” faired well with the media and reporters, those qualities did
not endear her to the more straight-laced members of Carter’s inner circle, nor did her open advocacy of gay and women’s rights.

In May 1978, Midge’s responsibility was drastically reduced and she was moved to a basement office. Following this precipitous change and unwilling to be blamed for jeopardizing Carter’s chance of winning the elections again, Ms. Costanza quit [8], [9].

4.5 **AFTER WHITE HOUSE**

Midge quit on September 1, 1978, affirming her support for Carter. Many feminists were angered following Midge’s resignation, blaming Carter, and feeling he had pressurized her to quit. Although Midge didn't leave the White House on circumstances she had hoped for, she still had respect for Carter and his administration. In a way she had created a foundation for all the causes she had fought for, a pioneering step for people to follow. After leaving the White House in 1978, she moved to Los Angeles and started working for Shirley MacLaine, where she managed Shirley's “Higher Self” seminars working behind the scenes on television shows like “America” and “America Talks Back.” Even though she was out of the White House, a prime place for politics, she continued her work on political causes and spoke at multiple venues across the country. While serving as the vice-president at Alan Landsburg Productions, she made various commercial films and advertisements. One of the other great causes she actively fought for was HIV/AIDS, which reflected in her work while serving as the Board Member for AIDS Research organization Search Alliance along with National Gay Rights Advocates.

In the year 1990 Midge relocated to San Diego, while continuing her work on political issues and public awareness. While serving as the coordinator for Barbara Boxer’s winning campaign and representative Lynn Schenk, she continued coaching aspiring political candidates for public speaking, giving them an insight based on her own experiences. She also served as the manager for Kathleen Crown in her unsuccessful attempt for Governor in 1994. John Duran said, chair of LIFE Lobby, “Midge Costanza was an early teacher for many of us after Harvey Milk’s death. She taught us about having access to power and was one of the first who demanded that we have a seat at the table.” In 2001, Midge served as liaison for women’s groups and issues under the then California Governor Gray Davis. She served that position until November 2003, when Davis lost his administration [8].
After her tireless work in a political career, Midge set her eyes on an albeit basic but very crucial venture, teaching students at San Diego State University about the presidency. Serving as a professor for both San Diego State University and University of California, she worked with the Political Science and women’s studies department to develop “The Midge Costanza Institute” in affiliation with Women’s Studies Department. The Institute hosted its own website where scholars interested in learning about political science would be able to browse through her extensive archive of documents. Midge’s hope in setting up the website was to offer insights into American History and political and social issues, in turn generating awareness amongst young minds to become actively involved in social and political issues.

Midge served on the board of directors of San Diego National Bank and in 2005, she joined the office of San Diego County District Attorney Bonnie M. Dumanis as a public Affairs Officer. “I’m the first woman DA in San Diego because Midge paved the way,” said Dumanis. “She helped me in my judicial races. That’s how we met.” With her new title as the Communications and Community Relations Divisions Head, she organized Consumer Protection Days, Citizens Academies and Women's Advisory Council with emphasis on the prevention of elder abuse. Midge along with Dr. Doreen Mattingly, taught a course on “Sex, Power and Politics” for women’s studies in San Diego State University [8], [9], [10].

4.6 DEATH

On Tuesday, March 23rd, 2010, Midge died after a long battle with cancer surrounded by family and friends at Scripps Mercy Hospital in San Diego, at the age of 77, leaving everyone who loved and adored her in great grief. Her brother, Anthony, survives her. Midge was a tireless advocate and impassioned champion for equality, justice and human rights. One of the last phone calls she received was from Jimmy Carter, after realizing that she was ill and hospitalized. “I’m just beginning to see how many people she has touched through the students she has worked with, politicians she has worked with, attorneys she has worked with. It’s such a big loss to all of us,” said Bonnie Dumanis, San Diego County District Attorney. “Every student said her coming to guest speak was the highlight of their college career,” said Dr. Mattingly [11].
4.7 HONORS

Midge has received several honors in her lifetime and thereafter. Some of the honors she received, in chronological order are [11]:

- Midge Costanza Day: City of San Diego named Oct. 7th, 2008 as “Midge Costanza Day”
- Outstanding Citizen of The Year: She was named “Outstanding Citizen of the Year 2009,” San Diego Business Journal.
- Hall Of Fame - 2011: Nominated and Inducted into San Diego County Women’s Hall of Fame by Women’s Museum of California, Commission on the Status of Women, University of California, San Diego Women’s Center, and San Diego State University Women’s Studies.
- Biography: Biography on Midge’s life is in progress and is being written by Dr. Doreen Mattingly.

Midge had a distinguished record as a champion of gay and women’s rights. Known for her quick wit and unabashed nature, she often generated controversy. Even people who disagreed with her, acknowledged her conviction and commitment towards the cause she fought for. People who knew her very well and even those people who met her once remember the highlights about her. “We’re all going to miss that feisty bundle of energy. The room just got a little darker now that she’s gone,” said Dumanis. People around the country often credit Midge for changing the way people thought about women, young and other minority groups. With her many popular and strong saying one of the quotes that strikes chords is, “When anybody’s rights are threatened, nobody’s rights are secure.”
CHAPTER 5

PROTOTYPE

A prototype in the world of software development refers to a working model of a product, which can be used for testing or can be used as a base product for customers, which can give them an idea about the future upcoming product. It can also be used to confirm and verify customer requirements or to test performance or to verify the design approach.

A working prototype helps us give user interaction during development cycle; determine the design flaws and we can simulate the final design, aesthetics, materials and functionality at low cost. On the other hand, it can have some drawbacks like slow down the development process if there are many users to satisfy, over long periods customers can lose interest or may have to cancel the product due to lack of market and it is generally not suitable for large applications.

Developing a prototype has helped me in this project, since I could take feedback from Dr. Mattingly regarding user interface and other specifications. I could also take feedback from Dr. Eckberg regarding the toolbars and features added in the application depending upon which the deadlines were estimated.

Figure 5.1 is the home screen when the tool is started. This was an early prototype for the thesis project.

There are 4 buttons on this screen:

1. Map: When you click this button, it will open the map where all the events from Midge Costanza’s life are listed and students can learn about it in detail.
2. Website: When you click this button, it will open the website that had detailed information about Midge Costanza’s life arranged systematically.
3. Quiz: When you click this button, it will open up the quiz having questions related to the events described in the application about Midge Costanza’s life in forms like: fill in the blank, multiple choice questions, picture questions.
4. Help: When you click this button, it opens up the help file where you can learn how to use this tool as an html page.
Figure 5.1. Start screen.

Figure 5.2 is the map tool where you can learn about all the life history events of Midge Costanza by clicking on the layer of the map. This tool will help the students learn geographical locations along with the historical events with details.

Figure 5.2. GIS tool – Midge Costanza’s life history.
Figure 5.3 [12] is the Fun Quiz screenshot where you can see the question, a picture of the map, 4 multiple choice answers and you can select one of them by clicking and submitting, it will then go to the next step. At the end it provides you with the score, report and all the correct answers.

![Fun Quiz Screenshot](image)

**Figure 5.3. Quiz. Source: Melroydmonty.com. Midge Memoir, 2012. midgememoir.melroydmonty.com, accessed Nov. 2012.**

Figure 5.4 is the About box window, which states that the tool is made for the department of Women’s Studies, San Diego State University where you can learn about Midge Costanza.
Figure 5.4. About box.
CHAPTER 6

SOFTWARE ARCHITECTURE

The software architecture can be defined as the structure of a system, which comprises of software components, relationships between them and their properties [13].

High Level Design provides an overview of the whole system identifying all its elements; the high level architecture is general-purpose architecture for distributed computer simulation systems. Using high-level architecture, computer simulations can communicate to other computer simulations regardless of the computing platforms [14].

Figure 6.1 shows the high-level architecture diagram for the GIS tool. The tool shall be structured into nine main components.

Figure 6.1. Software diagram.
When the application is launched, the home screen is displayed to the user. It gives access to five buttons to launch Map, Website, Quiz screen, Help doc and About box.

The Map button will launch a map with some default points on the map that gives information about Midge Costanza’s life events. New shape files can also be added to the map.

The Website button launches the web pages in the browser that gives information about Midge Costanza’s life, pictures and videos of her.

The Help button launches a web page in the browser describing the features of the map, how the application can be used so that the user can refer to it at the time of issue.

The Quiz button launches a web page in the browser where users can enter their names and take the quiz to analyze their knowledge. There are questions with pictures or multiple choices related to the topics covered in the application and a certificate is provided at the end with the score.

The About screen give a brief description of the tool, about the department, instructor and San Diego State University.
CHAPTER 7

NETBEANS IDE AND MAPOBJECTS

CONFIGURATION

NetBeans IDE is an integrated development environment used to develop JAVA applications including desktop and web applications. The reason of choosing NetBeans IDE for the development of the GIS tool is the ability provided by it to integrate with the Map Objects JAVA Edition beans allowing a drag and drop development and making the development easy [5]. The steps below explain how this was achieved:

1. Install NetBeans IDE from NetBeans website [15].
2. Install JAVA (SE) development kit 2 from JAVA site [16].
3. Install MapObjects JAVA Edition using the installation CD provided by Dr. Carl Eckberg upon request.
4. MOJO is integrated with NetBeans using MOJO libraries.
5. Launch NetBeans IDE.
6. Create a JAVA Application using NetBeans.
7. Select Tools->Libraries and a window shown in Figure 7.1 should appear.
8. Select New Library and a window shown in Figure 7.2 should appear.
9. Type in the new library name (in the sample the library has been named as ESRI_MapObjects_2.0.X) and click OK.
10. With the newly created library selected on the left, select the Classpath tab and then select the Add JAR/Folder as shown in Figure 7.3.
11. Navigate to the folder where MapObjects was installed (in the sample the installation was at C:\ESRI\MOJ20\lib).
12. Select all the JAR files and press Add JAR/Folder as shown in Figure 7.4.
13. Select Tools->Palette->Swing/AWT Component as shown in Figure 7.5.
14. Select Add from Library as shown in Figure 7.6.
15. Select the new library you created and select “Next” as shown in Figure 7.7.
16. Select all the items as shown in Figure 7.8.
17. Select Beans Folder as shown in Figure 7.9.
Figure 7.1. NetBeans - library manager.

Figure 7.2. NetBeans - new library.
Figure 7.3. NetBeans - library manager with new library.
Figure 7.4. NetBeans browse JAR folder.

Figure 7.5. NetBeans - palette menu.
Figure 7.6. NetBeans - palette manager.
Figure 7.7. NetBeans - install components to palette.

Figure 7.8. NetBeans - select palette components.
Figure 7.9. NetBeans - palette category selection.

Your Palette is now ready to use the objects, which can be selected and dropped onto the application.
CHAPTER 8

MAP OBJECTS TOOLBARS AND BUTTONS

MOJO in itself provides various tools to help developers implement certain key features. Figure 8.1 shows the toolbar with various tools that are provided. The toolbar itself can be categorized into various sections [17]:

- ZoomPan tools
- Add/Del Layer tools
- Selection tools
- Measure tools
- Print and other custom tools

Figure 8.1. MapObjects - toolbar.

All the sections in the MapObjects toolbar, including the custom tools like print and identify will be explained in detail below [18].

8.1 ZOOMPAN TOOLS

Figure 8.2 ZoomPan toolbar provides various utilities to help you zoom in and out of the scope on a map. Using tools like previous or next extent you can switch between different views. Pan tool helps you move around the map without changing the scope of the map. All the tools with their picture and their respective functions are listed in Table 8.1 [18].

Figure 8.2. MapObjects – ZoomPan toolbar.

8.2 LAYER TOOLBAR

Figure 8.3 depicts Layer toolbar that helps you add or remove layers from the shown map. This feature is especially useful to target specific information at any given point without cluttering the map. All the tools with their picture and their respective functions are listed in Table 8.2 [18].
Table 8.1. ZoomPan Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Zoom to previous extent" /></td>
<td>Zooms to previous extent</td>
</tr>
<tr>
<td><img src="image" alt="Zoom to next extent" /></td>
<td>Zooms to next extent</td>
</tr>
<tr>
<td><img src="image" alt="Zoom to selected features" /></td>
<td>Zooms the map to all selected features of selected layer</td>
</tr>
<tr>
<td><img src="image" alt="Zoom to extent all layers" /></td>
<td>Zooms to extent all layers within map – original size</td>
</tr>
<tr>
<td><img src="image" alt="Helps in zooming in" /></td>
<td>Helps in zooming in</td>
</tr>
<tr>
<td><img src="image" alt="Helps in zooming out" /></td>
<td>Helps in zooming out</td>
</tr>
<tr>
<td><img src="image" alt="Helps in moving" /></td>
<td>Helps in moving to any direction without zoom</td>
</tr>
<tr>
<td><img src="image" alt="Pans to any direction" /></td>
<td>Pans to any of one direction- North, South, East or West</td>
</tr>
<tr>
<td><img src="image" alt="Identifies area pointed" /></td>
<td>Identifies the area pointed in active layer</td>
</tr>
</tbody>
</table>


Figure 8.3. MapObjects - add/delete toolbar.

setMap() function is called before using any of these actions.

8.3 Selection Toolbar

Figure 8.4 Selection toolbar provides capability to create queries on the selected layer; the user can search for the specific information with the help of functionalities
Table 8.2. Add/Delete Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Add Layer" /></td>
<td>Helps to add new layer to table of contents</td>
</tr>
<tr>
<td><img src="image" alt="Delete Layer" /></td>
<td>Can Delete the selected layer from table of contents</td>
</tr>
</tbody>
</table>

Figure 8.4. Selection toolbar.

provided by this toolbar. All the tools with their picture and their respective functions are listed in Table 8.3 [18].

Table 8.3. Selection Tools

<table>
<thead>
<tr>
<th>Tool</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="String Search" /></td>
<td>Opens a dialog box for locating features whose attributes contain an end-user provided string</td>
</tr>
<tr>
<td><img src="image" alt=" Stored Query" /></td>
<td>Opens a dialog for locating features based on a predefined &quot;stored query&quot;</td>
</tr>
<tr>
<td><img src="image" alt="User Constructed Query" /></td>
<td>Opens a dialog for locating features based on a query than an end user constructs</td>
</tr>
<tr>
<td><img src="image" alt="Rubber Band" /></td>
<td>Tool for selecting features by rubber banding a shape in the map</td>
</tr>
<tr>
<td><img src="image" alt="Buffer Polygon" /></td>
<td>Opens a dialog for constructing a buffer polygon around currently selected features</td>
</tr>
<tr>
<td><img src="image" alt="Attributes Display" /></td>
<td>Tool to display attributes of currently selected features</td>
</tr>
</tbody>
</table>

8.4 MeasureGeocode Toolbar

Figure 8.5 MeasureGeocode tool bar provides capability to allows the users to measure the distance between two points on the map. All the tools with their picture and their respective functions are listed in Table 8.4 [18].

![MeasureGeocode toolbar](image)

Figure 8.5. MeasureGeocode toolbar.

<table>
<thead>
<tr>
<th>Tool</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Rubber Band Tool" /></td>
<td>A rubber band tool for measuring distances on screen</td>
</tr>
<tr>
<td><img src="image" alt="Dialog for Street Address" /></td>
<td>Opens a dialog selecting a location based on a street address</td>
</tr>
<tr>
<td><img src="image" alt="Dialog for Map Tips" /></td>
<td>Opens a dialog for choosing map tips</td>
</tr>
</tbody>
</table>


8.5 Custom Buttons

The default tools provided by MOJO are self-content to some extent. But the user needs some way to identify specific information on the map, if the map in question is a custom map. My application includes this tool that identifies a certain point on the map and details information specific to the selected point. The application also provides an arrow and a print tool. All the tools with their picture and their respective functions are listed in Table 8.5 [18].

8.5.1 Print

The implementation of this tool which helps the user to print the map was done using the following code:
### Table 8.5. Custom Buttons

<table>
<thead>
<tr>
<th>Tool</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Print Button" /></td>
<td>This tool provides the user the functionality of printing the map</td>
</tr>
<tr>
<td><img src="image" alt="Unselect Tool" /></td>
<td>This helps user to unselect any selected tool</td>
</tr>
<tr>
<td><img src="image" alt="Identify Tool" /></td>
<td>Identifies the area pointed in active layer and also gives the ability to launch the URL from the button.</td>
</tr>
</tbody>
</table>

```java
public void printButtonActionListener() {
    com.esri.mo2.ui.bean.Print map1Print = new com.esri.mo2.ui.bean.Print(map1);
    map1Print.doPrint();
}
```

#### 8.5.2 Arrow

This helps the user to unselect any selected tool from MapObjects toolbars or from the custom buttons. The following code explains how creating a function called arrowButtonActionListener and tying it to the action of the button press for the tool button can run this tool.

```java
public void arrowButtonActionListener() {
    Arrow arrow = new Arrow();
    map1.setSelectedTool(arrow);
}
```

#### 8.5.3 Identify

Identify tool as discussed earlier provides detailed information about a selected point on the map. This information can be customized in the shape file itself to provide information like web link, images, geographic data and references. This tool provides data in a tabular form and is easy to ready and understand.

#### 8.6 Co-Operation Display

XY display of the location of the mouse pointer has been a great tool for the user using this GIS tool as it gives the geographical coordinates of any point on the map. The implementation of this tool has been taken from Dr. Carl Eckberg’s notes [6].
CHAPTER 9

PROJECT LAYERS

ESRI introduced Shapefiles format in one of its products called ArcView. ArcView is a more generic tool that promotes a wide variety of functions. Shapefiles are basically comprised of similarly named files with different suffixes:

- Shapefile_1.shp
- Shapefile_1.dbf
- Shapefile_1.shx

If a shapefile uses similar prefix, it usually serves as a data source. Each shapefile serves as a layer and each of the extensions support a single layer of GIS data. Data source is usually a directory that carries all the Shapefiles in one directory that help us to load the entire directory as a single store. For this tool we will be using the data store that facilitates the modular approach. Each layer depicting a certain set of events helps us understand the life history of Midge Costanza in an eventfully organized manner.

9.1 FEATURE LAYERS

Each feature layer represents a set of data unique to the event. This data is represented in form of points, lines and polygons. Although for all development purposes the data is stored locally, once deployed into an executable, can be accessed anywhere through a package. There are multiple feature layers in this tool:

1. States Layer
2. Childhood, Schooling and Congressional Aspirations Layer (Before White House)
3. Woman in White House Layer (in White House)
4. After White House Layer (in Los Angeles)
5. After White House Layer (in San Diego)

See Figures 9.1 to 9.4 for feature layers of the tool.
Figure 9.1. Main page for the tool.

Figure 9.2. Page identifying life before white house, where Midge ran for the title of Mayor.
Figure 9.3. Preview for the points depicting Midge’s life while in White House.

Figure 9.4. Life after White House in San Diego.
9.2 CSV FILES

CSV or comma separated value is a very simple file format that predates personal computers. CSV is usually a text file with following attributes [19]:

- Each line usually denotes a single record.
- Each record consists of multiple fields separated using a delimiter (comma, semicolon and even spaces).
- Each record must follow a single sequence of fields.

In our case we are using comma as a delimiter. Each shape file is generated with the help of CSV file. In our case the CSV file has following format:

\{Y-Coordinate, X-Coordinate, Name, Event, Period, Link\}

Snapshots of the CSV files used in our tool are shown in Figure 9.5.

Figure 9.5. CSV file depicting the information for the shape file.
CHAPTER 10

SCREENSHOTS

This chapter highlights all the screenshots of various aspects of the website and various modules used in the tool (Figure 10.1 and 10.2 [12], [20], Figure 10.3 [12], [21], Figure 10.4 [12], [22], Figure 10.5 [12], Figure 10.6 [12], [23], Figure 10.7 [12], [20], and Figures 10.8 and 10.9 [12]).


CHAPTER 11

CONCLUSION AND OBSTACLES

In the process of creating this tool we learned a lot of things, also aggregating all the relevant data into one place making it easier for all the students to access it anytime they want. As discussed earlier this tool was developed to enable the use of technology in ways to teach students beyond the classroom.

This tool comprises various elements and each of those element is supposed to help students better understand the life of Midge Costanza and her fight for various issues. The ease of deployment and portability make this a strong tool in the student’s arsenal of learning. Also the web access and quiz provide a means for the teacher to test student’s knowledge on the subject.

Development of this tool had its challenges and obstacles, researching a lot about Midge and the technologies to be used. It was a great help from Dr. Eckberg personally and his books to help me better understand the implementation of this tool using Java and GIS. Dr Mattingly provided a lot of help and information from the very beginning about Midge and her life making it easier to aggregate the data and present it accordingly.
CHAPTER 12

FUTURE ENHANCEMENTS

Although this tool was designed to accommodate all the basic necessities of a student to learn more about Midge Costanza, there are various enhancements that can be made to make it better in the future. Some of the future enhancements are as listed below:

- This tool could be distributed in a form of an app on all the major Smartphone platforms.
- Although there are web maps that depict similar information as the tool does, having an integrated map and search tool would be more beneficial.
- This tool can be localized to support multiple languages.
- One of the major enhancements to this tool could be a unified Interface that an instructor uses to include information on any topic or person and have the application spit out an executable that detail on selected topic.
BIBLIOGRAPHY


