Crime Buster Application

System Requirements Specification

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Presented to

Mr. Jonathan Pautsch of

Next Century Corporation

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Software Engineering I

CMSC 447

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By

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19 February 2018

Tables of Contents

1. Introduction
   1.1. Purpose of this Document
   1.2. References
   1.3. Purpose of the Product
   1.4. Product Scope
2. Functional Requirements
   2.1. Use Case 1
   2.2. Use Case 2
   2.3. Use Case 3
   2.4. Use Case 4
   2.5. Use Case 5
   2.6. Use Case 6
   2.7. Use Case 7
   2.8. Use Case 8
   2.9. Use Case 9
   2.10. Use Case 10
   2.11. Use Case 11
   2.12. Use Case 12
3. Use Case Tests
   3.1. Use Case 1 Test - Load the web application
   3.2. Use Case 2 Test - Account Details
   3.3. Use Case 3 Test - Visualization type selection
   3.4. Use Case 4 Test - Display tooltip details
   3.5. Use Case 5 Test - Display/input new comment
   3.6. Use Case 6 Test - Display comments on a crime
   3.7. Use Case 7 Test - Zoom in and Out on Map View
   3.8. Use Case 8 Test - Filter the data based on crime type
   3.9. Use Case 9 Test - Filter the data based on the date / time the crime was committed
   3.10. Use Case 10 Test - Filter the data based on the location (area/neighborhood)
   3.11. Use Case 11 Test - Filter the data based on weapons
   3.12. Use Case 12 Test - Data Selection
4. Non-Functional Requirements
5. Non-Functional Requirements Tests
6. User Interface

7. Deliverables
8. Open Issues
9. Appendix A – Agreement Between Customer and Contractor
10. Appendix B – Team Review Sign-off
11. Appendix C – Document Contributions

1. Introduction

1.1 Purpose of this Document

The purpose of this document is to explain the functional and nonfunctional requirements for the Crime Buster application, as well as to provide a diagram for the overall design of the application. Requirements are implemented as in the form of use cases, where each case corresponds to a specific functionality of the application. The intended audience for this product are the Baltimore Police Department, Next Century Corporation, and Dr. Wilson of the University of Maryland, Baltimore County.

1.2 References

[1] Baltimore Police Department. "BPD Part 1 Victim Based Crime Data | Open Baltimore | City of Baltimore's Open Data Catalog." *City of Baltimore*, Socrata, data.baltimorecity.gov/Public-Safety/BPD-Part-1-Victim-Based-Crime-Data/wsfq-mvij.

[2] Carrico, Luke, et al. "NSF HERD Data Visualization." NSF HERD Data Visualization, Heroku, cmsc436.herokuapp.com/.

[3] Patel, Vihar. "Graphical Tool for Applicant Pool Data." CMSC 436 Project, Heroku, cwit-436.herokuapp.com/.

[4] Y. Wang, S. Wang, X. Li, H. Li and J. Du, "Identifier Naming Conventions and Software Coding Standards: A Case Study in One School of Software," *2010 International Conference on Computational Intelligence and Software Engineering*, Wuhan, 2010, pp. 1-4.

1.3 Purpose of the Product

Crime Buster was designed to model a crime data visualization application that can assist the Baltimore police in making decisions regarding crime prevention. By using the crime dataset on the Open Baltimore website, Crime Buster allows its users to filter the dataset and generate various visualizations such as geospatial maps, heat maps, charts, and stacked bar graphs. These visualizations can be used to investigate and determine locations, time, patterns, and occurrence of certain crime, which will assist the police in creating better solutions that will help make Baltimore safer.

1.4 Product Scope

Crime Buster consists of many use cases including, but not limited to querying the database, generating various visualizations, viewing detail information of a crime, seeing crime statistics, adding private and public comments for a particular crime. This system will be design to work with corporate SSO. Please refer to figure 1 below for further understanding of the actions available to users.

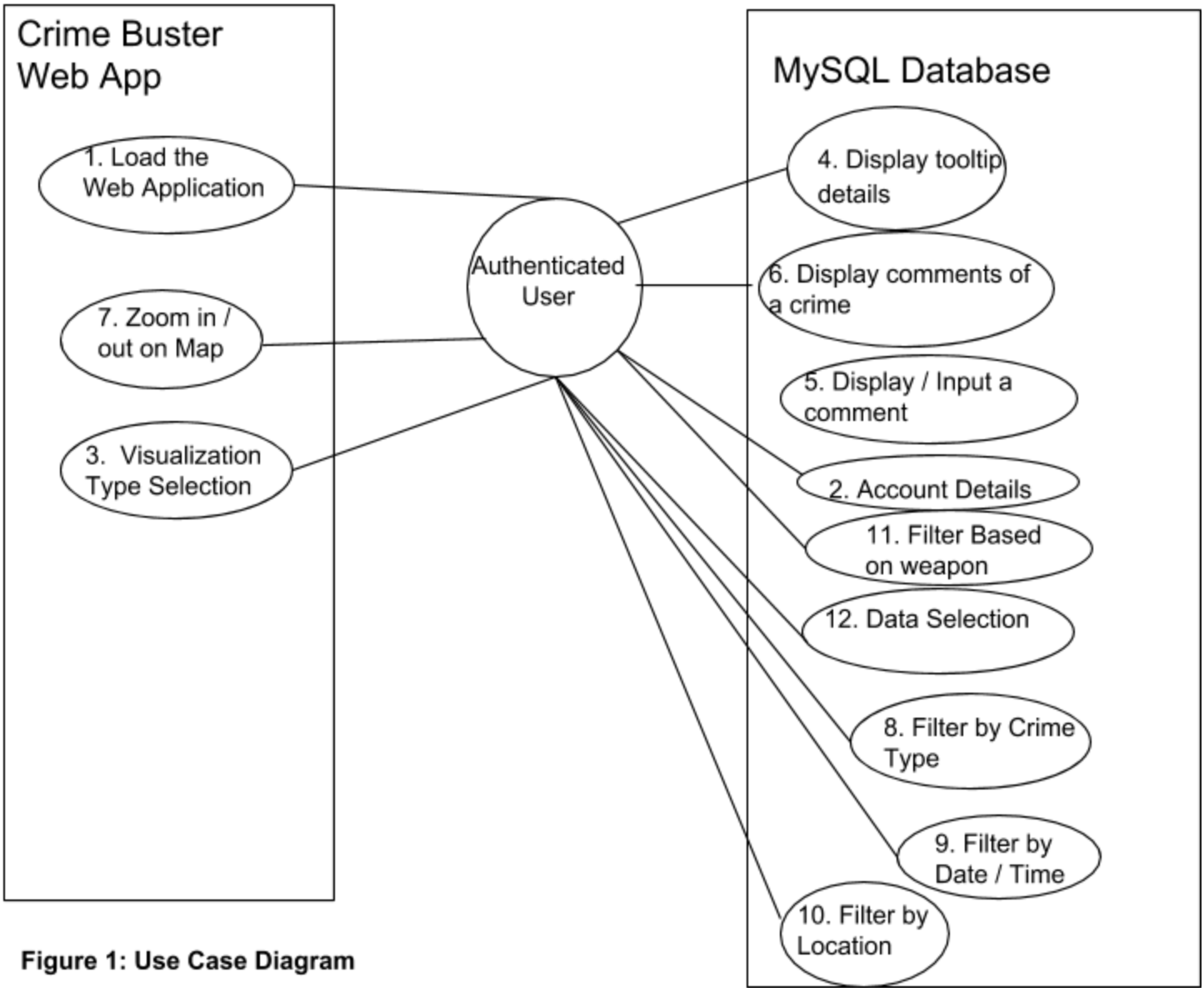


Figure 1: Use Case Diagram

2. Functional Requirements

Please refer to the use case diagram, figure 2, above for an overview of each use case.

2.1 Use Case 1

Number	1	
Name	Load the Web Application	
Summary	The web page loads to a default of a map visualization.	
Priority	5	
Preconditions	User must be authenticated and on the site	
Postconditions	User views the selected dataset in different visualizations	
Primary Actor	Authenticated User	
Secondary Actors	None	
Trigger	User visits the main page of crime buster or clicks main page tab at the top of the web page	
Main Scenario	**Step**	**Action**
	1	Load Page
Open Issues	None	

2.2 Use Case 2

Number	2	
Name	Account details	
Summary	View Account Details such as name, department, and have options to make comments public or private	
Priority	3	
Preconditions	User is able to access the site through corporate SSO	
Postconditions	User views information pertaining to their account and also determine if their comments are only available to them or others	
Primary Actor	Authenticated User	
Secondary Actors	MySQL database	
Trigger	User clicks Profile button in the Upper right corner and select the Account Details button	
Main Scenario	**Step**	**Action**
	1	User click account details button
Extensions	**Step**	**Branching Action**
	1a	Loads page where user can view account detail with option to make their default comments public or private
	1b	If any information is updated, user must click the save button to update the database
Open Issues	None	

2.3 Use Case 3

Number	3	
Name	Visualizations Type Selection	
Summary	This allows users to select multiple types of visualizations (Graph, Map, Chart, and table) of the data they choose on the same page at once, and users are able to unclick to delete visualization blocks too.	
Priority	5	
Preconditions	The main page must load successfully, and the filter must work consistently on all the visualizations.	
Postconditions	Different types of selected visualizations will show on the main page in the same time.	
Primary Actor	Authenticated User	
Secondary Actors	Crime Buster web application	
Trigger	Users click the the check boxes for visualization choices	
Main Scenario	**Step**	**Action**
	1	User clicks the the boxes for visualization choices
Extensions	**Step**	**Branching Action**
	1a	System goes to the code for the models of the visualizations that user chooses
	1b	Display it on the page in different blocks
Open Issues	The user ability of changing the size of the blocks of each visualization and dragging them around.	

2.4 Use Case 4

Number	4	
Name	Display tooltip details	
Summary	When user hovers over on a dot of a map, a tooltip will show the specific crime information; When user hovering over part of graph or chart, a tooltip will show the detail information of that specific area on the graph or chart.	
Priority	4	
Preconditions	Map, graph or chart must be well displayed	
Postconditions	Detail information about the dot/part of the graph or chart is displaying on the tooltip	
Primary Actor	Authenticated User	
Secondary Actors	MySQL database	
Trigger	User hovering over a dot on the map or a part on the chart or graph	
Main Scenario	**Step**	**Action**
	1	User hovering over on a dot on the map or a part on the chart or graph
	2	When hovering over a dot on a map, details corresponding to the specific crime for that dot are displayed such as the address, weapon used, date, time, and crime code.
	3	When hovering over a part on a chart or graph, details on what that quantity represents are displayed.
Extensions	**Step**	**Branching Action**
	1a	System goes to the MySQL and find the corresponded information

	2a	Display it on the right top of the mouse
Open Issues	Whether to use the trigger as hovering or clicking on the area where more information is desired.	

2.5 Use Case 5

Number	5	
Name	Display/Input a new comment	
Summary	Authenticated user can comment on a specific crime	
Priority	3	
Preconditions	User must be logged in; User click on a dot on the map and click on the blank for new comments area	
Postconditions	The new comment is posted in the comments area	
Primary Actor	Authenticated User	
Secondary Actors	MySQL database	
Trigger	Write on the empty new comment area and click submit	
Main Scenario	**Step**	**Action**
	1	Access the Map Visualization on the site
	2	Click on a dot of the map and click add comment
	3	Select Comment type, public or private, which will override default comments in Account settings
	4	Write Comment
	5	Click submit button

Extensions	Step	Branching Action
	1a	Add the new user comment into the MySQL database
	2a	Display the new comment in the comment area in less than 3 seconds
Open Issues	None	

2.6 Use Case 6

Number	6	
Name	Display comments on a crime	
Summary	User can see all the comments about the crime after they select the dot on the map	
Priority	3	
Preconditions	User click on a dot of the map	
Postconditions	Comments about the crime are displayed on the bottom of the webpage	
Primary Actor	Authenticated User	
Secondary Actors	MySQL database	
Trigger	Clicking on a dot on the map	
Main Scenario	**Step**	**Action**
	1	click a dot on the map
Extensions	**Step**	**Branching Action**
	1a	System goes to the database and find the specific crime

	2a	Display the comment information for the crime on the bottom of the page in less than 3 seconds
Open Issues	Weather or not the new comment blank should be shown on then page even when the user is not registered	

2.7 Use Case 7

Number	7	
Name	Zoom in and Out on Map View	
Summary	User can adjust the zoom level on the map to allow for better visibility.	
Priority	3	
Preconditions	Map must be displayed	
Postconditions	Map will be zoomed to a different scale	
Primary Actor	Authenticated User	
Secondary Actors	Crime Buster Web Application	
Trigger	User drags a slider in the corner of the map to desired magnification, or uses a mouse wheel, or keyboard shortcuts	
Main Scenario	**Step**	**Action**
	1	User clicks the map slider and drags the mouse up or down, or slides mouse wheel up or down
	2	Map zooms in when the slider / mouse wheel is dragged up, and down when the slider / wheel is dragged down
Extensions	**Step**	**Branching Action**

	1a	If the map cannot zoom in any further, display a message saying so.
	1b	If the map cannot be zoomed out any further, display a message saying so.
Open Issues	None	

2.8 Use Case 8

Number	8	
Name	Filter the data based on crime type	
Summary	User selects one or more crime types to be displayed	
Priority	5	
Preconditions	The data must be loaded to the database with the drop down list available	
Postconditions	The specified crime types are displayed on the visualization portion of the website in the form that has been selected (Map / Table / Graph / Chart)	
Primary Actor	Authenticated User	
Secondary Actors	MySQL Database, Crime Buster Web Application	
Trigger	User clicks the drop down menu and selects crime types	
Main Scenario	**Step**	**Action**
	1	User selects one or more crime types from a drop down menu
	2	The system queries the database to select the proper crimes

	3	The selected crimes are displayed to the user in the selected form (Map / Table / Graph / Chart).
Extensions	**Step**	**Branching Action**
	1a	If a crime type is not in the database: display a message saying so.
Open Issues	None	

2.9 Use Case 9

Number	9	
Name	Filter the data based on the date / time the crime was committed	
Summary	User selects a start date from a drop down calendar and an end date from a drop down calendar. User inputs a start time (0-24) and end time (0-24). Crimes within the specified time frame are displayed.	
Priority	5	
Preconditions	The data must be loaded to the database with the drop calendars available and time input areas available	
Postconditions	The crimes within the selected ranges are displayed on the visualization portion of the website in the form that has been selected (Map / Table / Graph / Chart)	
Primary Actor	Authenticated User	
Secondary Actors	MySQL Database, Crime Buster Web Application	
Trigger	User selects the date / time restrictions	
Main Scenario	**Step**	**Action**

	1	User selects a start date from a drop down calendar and an end date from a drop down calendar.
	2	User inputs a start time (0-24) and end time (0-24).
	3	The system queries the database to select the proper crimes
	4	The selected crimes are displayed to the user in the selected form (Map / Table / Graph / Chart).
Extensions	**Step**	**Branching Action**
	1a	If there are no crimes for the time period: display a message saying so.
	1b	If the user enters invalid numbers for start and end time (end is greater than start, or they are out of the 0 to 24 range): default start to 0 and end to 24 and display an invalid times message.
	1c	If the user enters invalid start and end dates (end is before start): default to all crimes and display an error message.
Open Issues	Debate of whether it is better to use military time, AM / PM, or give the user the option to choose which to use.	

2.10 Use Case 10

Number	10
Name	Filter the data by the location of the crime.
Summary	The user is given the ability to filter the crime data by the location that it took place in.
Priority	5

Preconditions	The data must be loaded to the database and the user must be logged in.	
Postconditions	The crimes within the selected locations are displayed on the visualization portion of the website in the form that has been selected (Map / Table / Graph / Chart)	
Primary Actor	Authenticated User	
Secondary Actors	MySQL database	
Trigger	User uses the location filter to only show crimes in a certain area.	
Main Scenario	**Step**	**Action**
	1	User selects location filter to choose the area they are most interested in.
Extensions	**Step**	**Branching Action**
	1a	If there are no crimes in the database for that specific area, display a message saying so.
	1b	If an invalid location is selected, display a message saying so.
Open Issues	Open issue of what to filter the location by: district, neighborhood, latitude and longitude, or some combination of those.	

2.11 Use Case 11

Number	11
Name	Filter the data based on weapon
Summary	The user is given the ability to filter the crime data by the weapon type
Priority	4

Preconditions	The data must be loaded to the database and the user must be logged in.	
Postconditions	The crimes based on the selected weapon type are displayed on the visualization portion of the website in the form that has been selected (Map / Table / Graph / Chart)	
Primary Actor	Authenticated Users	
Secondary Actors	MySQL database	
Trigger	User selects the weapons type filter	
Main Scenario	**Step**	**Action**
	1	All crime committed with the selected weapon type is displayed
Extensions	**Step**	**Branching Action**
	1a	If there are no crimes in the database that fits this filter display a message saying so.
Open Issues	None	

2.12 Use Case 12

Number	12
Name	Data selection
Summary	Highlights selected data on all other visualizations
Priority	3
Preconditions	The data must be loaded to the database, some data must be displayed on at least 2 visualizations and the user must be logged in.
Postconditions	The selected instances are highlighted across all visualizations.

Primary Actor	Authenticated User	
Secondary Actors	SQL Database	
Trigger	User selects data to be displayed	
Main Scenario	**Step**	**Action**
	1	User clicks a portion of data in a visualization
	2	Selected data shall be highlighted on all other visualizations.
	3	If the user desires, they can filter by the selected data by using that option in the filtering menu.
Extensions	**Step**	**Branching Action**
	1a	User clicked an empty section of visualization, nothing is highlighted.
Open Issues	None	

3. Use Case Tests

3.1 Use Case 1 Test - Load the Web Application

Try to load the web application. Ensure that the default page opens with the map visualization preselected and displayed.

3.2 Use Case 2 Test - Account Details

After clicking on the Account Details button, a page will load with information pertaining to the user account with option make their comments private or public. This function can be verify when the user see the PII for their account and change the status of their comments, you can check the database to ensure that their information was updated.

3.3 Use Case 3 Test - Visualizations Type Selection

After checked on multiple boxes on the visualization menu, the system should go to the code of the visualizations and show the blocks on the page in 3 seconds. All the data that the visualizations show should be consistent (align with the filter that user choose). Confirm the information on the visualization using the MySQL database; change the filter to see if all the

visualizations on the page change; unclick one of the visualization on the page to see if that visualization block would disappear.

3.4 Use Case 4 Test - Display tooltip information about the details

Hovering over one a dot on the map or a part of a graph or chart under any filter, check if the tooltip displays at the correct place; check if the information is correct to the corresponded crime or attribute by searching it in the database or on the open baltimore website.

3.5 Use Case 5 Test - Display a new comment user input area

Make comments/note perform the following 2 tests. Check that when you click on crime that the comments you added are display. If the comments you added are public, have another user login to the system and view the same crime and check if your comments are display.

3.6 Use Case 6 Test - Display notes on a crime

After clicking on the dot on the map, comments about the specific crime should be displayed in 3 seconds on the web page; search in the database of the specific cime to see if the comments that are displaying corresponding to the crime.

3.7 Use Case 7 Test - Zoom in/out in map view

User can adjust the zoom level within the map view. Test by executing both zoom commands and ensuring they produce the expected results.

3.8 Use Case 8 Test - Filter the data based on crime type

Use the filter option to select one or more crime types. Confirm that the crimes of the specified types are displayed and that the types not selected are not displayed. Try to find a crime type that is not in the database to see the error message functionality.

3.9 Use Case 9 Test - Filter the data based on the date / time the crime was committed

Select time ranges and perform the following 3 tests. The first is entering a valid date and time range, and confirming that only crimes that took place in the specified ranges are displayed. Second, enter an invalid start and end date (end date is before the start date) and confirm the proper error message prints with the default being that all data shows in the display. The last case is when invalid times are entered, enter a time outside the range 0-24, and also try an end time before the start time to confirm that the proper error message prints in each situation and that the system defaults to the 0-24 time range showing all crimes for the selected date range.

3.10 Use Case 10 Test - Filter the data by the location of the crime

After selecting a location to filter by using the filtering tool, check to ensure that the data visualization display only shows the crimes within the selected criteria. Try to select an invalid location and check to make sure that the proper error message appears. Finally, try to select an area with no crimes in it to ensure the message that no crimes are in this area is displayed.

3.11 Use Case 11 Test - Filter the data based on weapon

After selecting a weapon type to filter by using the filtering tool, check to ensure that the data visualization display only shows the crimes within the selected criteria. It no data exist for this filter, ensure the message that no crimes exist for this filter is displayed.

3.12 Use Case 12 Test - Data Selection

After selecting data, check to make sure that it is highlighted in all the other visualizations. Also check to make sure clicking an empty area results in nothing being highlighted.

4. Non-Functional Requirements

Some things are a necessity when creating a web application. Below outlines the criteria used to judge the system as a whole.

#	Item	Priority 1 (lowest) to 5 (highest)
1	The user information must be secure	5
2	Reliable performance (Site will have 99% uptime)	5
3	The system must be user friendly.	4
4	All steps and design shall be well documented, and all sources shall be cited.	3
5	All code must follow IEEE coding standards	3
6	Dataset set shall be updated	5

	Biweekly	
7	The system shall be 508 Compliant	4
8	The system shall be able to integrate with corporate SS0	5
9	The system shall provide a mobile interface.	4
10	Must display visualizations in 3 seconds or less	3

5. Non-Functional Requirements Tests

Test #	How you can validate tests
1	Looking in Database will show the result of the md5 hash function.
2	Amazon web services will handle our site reliability.
3	Try to train an officer to use the app, and check the ease of use.
4	See UI and SRS design document.
5	See source code.
6	See footnote at bottom of webpage.
7	Ensure colors scheme fulfills color blindness requirements
8	Cannot access site unless you are logged into a corporate account
9	Test application using various mobile devices.

10	Display runtime at bottom of visualizations

6. User Interface

See "User Interface Design Document for *Crime Buster*."

7. Deliverables

Deliverables include:

Name	Format	Date
Systems Requirement Specification	Soft copy, .pdf	3/5/18 11.59 PM EST
System Design Document	Soft copy, .pdf	4/4/18 11.59 PM EST
Code Inspection Report	Soft copy, .pdf	4/25/18 11:59 PM EST
Testing Report	Soft copy, .pdf	4/25/18 11:59 PM EST
Administrator Manual	Soft copy, .pdf	5/7/18 11:59 PM EST
All Source Code	Soft copy, .zip	5/14/18 11:59 PM EST

8. Open Issues

Issues that have been raised and do not yet have a conclusion will be addresses later in the development process. Please refer to the table below.

Issues	Scheduled for
508 Compliant (Ensure the application has a color scheme that is color blind compatible)	System Design Document
The user ability of changing the size of the blocks of each visualization and dragging them around.	Administrator Manual Document

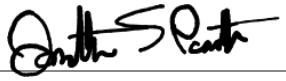
Open issue of what to filter the location by: district, neighborhood, latitude and longitude, or some combination of those.	System Design Document
For filtering by time, the debate of whether it is better to use military time, AM / PM, or give the user the option to choose which to use.	System Design Document
For displaying comments on a crime, whether or not the new comment blank should be shown on then page even when the user is not registered	System Design Document
For viewing details on a crime, whether to use the trigger as hovering or clicking on the area where more information is desired.	System Design Document

9. Appendix A – Agreement Between Customer and Contractor

The customer agrees to a crime data visualization application that uses data from the open baltimore site to create various maps, charts, and graphs which will visualize crimes in baltimore. Use cases are included in the functional requirements section above of the behavior between the system and user. Additional features will be provided in further development spirals. When and if future changes to this document occur a drafted new document will be created. An electronic copy of both versions will be presented to the client for review. Upon approval, the draft will be finalized and signed off by both parties.

Client

Name: Jonathan Pautsch Date: 03/05/2018



Signature

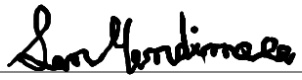
Comments

Team

Name: Angel Cheng Date: 03/05/2018

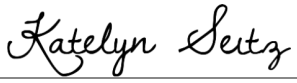
Signature

Name: Sam Mendimasa Date: 03/05/2018



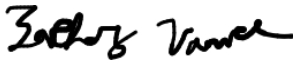
Signature

Name: Katelyn Seitz Date: 03/05/2018



Signature

Name: Zachary Vance Date: 03/05/2018



Signature

10. Appendix B – Team Review Sign-off

This document has been collaboratively written by all members the team. Additionally, all team members have reviewed this document and agree on both the content and the format. Any disagreements or concerns are addressed in team comments below.

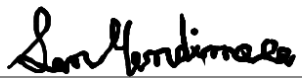
Team:

Name: Angel Cheng Date: 03/05/2018

Signature

Comments

Name: Sam Mendimasa Date: 03/05/2018



Signature

N/A

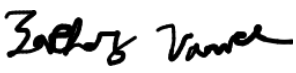
Comments

Name: Katelyn Seitz Date: 03/05/2018

Signature

Comments

Name: Zachary Vance Date: 03/05/2018



Signature

We held meetings and worked well together to divide the work and finish the best document possible.

Comments

11. Appendix C – Document Contributions

Throughout the development of this document, each team member contributed in some way, hence the overall work distribution split evenly across all members (Angel 25%, Sam 25%, Katelyn 25%, and Zach 25%). The specific breakdown of work contribution is also divided across all sections, as we all work on the functional and non-functional requirements, test cases, product purpose and scope, and appendices A, B, and C. Sam, our SRS lead was especially helpful and facilitated the development of this document.

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VIEWED	**03/06/2018** 01:25:06 UTC	Viewed by Katelyn Seitz (kate14@umbc.edu) IP: 130.85.59.147

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SIGNED	**03/06/2018** 01:26:45 UTC	Signed by Katelyn Seitz (kate14@umbc.edu) IP: 130.85.59.147
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