GWPD CRIME DATA ANALYSIS PLATFORM  
FUNCTIONAL SPECIFICATION

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**Overview**

The Crime Data Analysis Platform (CDAP) is a web-based tool used for analysis and reporting of data managed by the GW Office of Safety and Security’s (OSS) crime reports management database (called “ARMS”). The purpose of the application is to fulfill the visualization and analysis needs currently unmet by OSS’s existing database management platform while leveraging the data contained within these applications.

The application will have two modes of operation: **user-interactive** and **batch processing**. The user-interactive component will be comprised of a web application that provides a mapping interface that allows the end-user to explore the raw and analyzed datasets, providing a visual method of interpreting the application’s data analyses. The batch-processing subsystem will house all of the actual analysis methods and will not be visible to the end-user. Instead, this system will run scheduled background jobs that generate the data that is used by the user-interactive portion of the program. The batch processor will also be responsible for sending scheduled notifications to the end-users informing them of the completion of scheduled analyses.

**Interface**

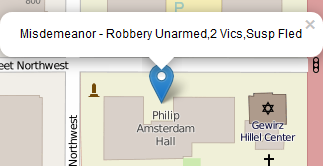
The user interface will be entirely web-based. A typical page (once authenticated) will generally consist of a primary navigation bar at the top of each page. The navigation bar will provide links to various parts of the application and information about the current user session.

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| --- | --- | --- | --- | --- | --- | --- |
| **CDAP** | Home | Maps | Reports | Logged in as: JSmith | Database: Production | Logout |

*Figure 1: Sample primary navigation bar*

The mapping interface will be display a full-screen (except for the navigation bar) interactive map that displays the data requested by the user. The base map on which the data is overlaid will be provided by OpenStreetMap (OSM). OSM provides a visually appealing, detailed map of the Foggy Bottom, Mount Vernon, and Ashburn campus locations and the surrounding areas, making it ideal for this application. The OSM client (run on the client-side) will retrieve the GIS data from the CDAP server and will overlay this data on top of the base map. The data will be divided into layers, and the OSM client will provide a set of toggles which allow the user to show or hide a given subset of the displayed data to suit their needs.

When the mapping interface is first opened, the map will be centered near the midpoint of the Foggy Bottom campus. The map will be populated with a combination of pins and shapes, which represent the data that the user requested. The user will be able to click on these icons to obtain additional information about what that item represents:

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Figure 2: Sample tooltip indicating a misdemeanor robbery at Philip Amsterdam Hall*

The color of the pins and shapes will be configurable by a system administrator, and will serve as visual identifiers of different crime types or other data points. For example, a blue pin could represent a misdemeanor report, a red pin could mean a felony report, and grey pins could be associated with administrative reports not associated with specific crimes.

**Scenarios**

1. Officer Barbrady is interested in seeing which residence halls are likely to experience higher-than-usual rates of crime based on recent historical data. Officer Barbrady logs into the web portal and is presented with a list of reports and mapping options. He selects the relevant map, which is a heatmap showing where crime is happening on campus and where it is likely to happen as a result. He finds that East Hall is dark red, indicating a high concentration of crime reports. He clicks on the pins on East Hall and finds that there have been 7 reports of theft in the last week. He views the details of some of the reports and finds that 5 of the 7 thefts were from residence hall rooms that were left unlocked. As a result, Officer Barbrady decides that he will start his patrol in East Hall, going floor-by-floor reminding residents to lock their doors.
2. Lieutenant Joe Swanson is in charge of the Police Department’s student-volunteer program. These students sit at the entrances to residence halls and verify that entrants present a valid GWorld card that has the correct access level for that building. Lieutenant Swanson views a tabular report detailing the overall number of reports filed per day over a week in all buildings on the Foggy Bottom campus classified as residence halls. He finds that there is a marked uptick in reports in John Adams Hall on Thursday nights, while there are almost no reports in this building on Friday nights. He therefore arranges for a security officer to accompany the student volunteer in John Adams Hall on Thursdays, in an attempt to catch illegal entry and deter further crimes.
3. After consultation with the stakeholders, the CDAP systems administrator configures the application to download data from the production ARMS database once a week, on Monday evenings. This is normally not an issue, but one Friday morning, Assistant Chief Wiggum wants to view reports that include the current week’s data. Since Assistant Chief Wiggum has been granted the “Import Director” access role within CDAP, he is able to access a portion of the administration interface when he logs in. Assistant Chief Wiggum clicks on the “Import Data Immediately” link in the administration interface, which forces CDAP to reach out to ARMS for the most recent data outside of the scheduled import window. The application displays a warning indicating that the import process may take many hours to run, and may slow down both ARMS and CDAP while it is running. The warning dialog asks him to re-enter his password to confirm his choice. When he does so, the import batch process begins running. Since the import process may take a long time, CDAP will send Assistant Chief Wiggum an email when the import is complete and the data ready to use.
4. Captain Cook is interested in where bike thefts are happening on campus, and wants to be able to proactively head them off. He asks the CDAP system administrator if there is any way this can be done. The CDAP system administrator fulfills this request by adding a step to the ARMS import workflow that is run by the automated batch processor. This step compares the number and location of bike thefts in the area over the last week to the previous period. Changes in number or location of these thefts will trigger an email notification to Captain Cook. The email may contain attachments or links to maps and tabular reports detailing these changes, allowing the agency to respond quickly.

**What this application will not do**

CDAP is not designed to process a live stream of events from ARMS, or any other external service. Due to the complexity of the analysis steps performed on imported data, changes to the ARMS dataset will only be imported and processed on a specific interval, or when this process is manually kicked off via the web interface (which will make clear that this is a slow, computationally-costly operation that should not be executed often). The application will also not write anything back to ARMS at all, and the parts of the user interface in which data can be modified will make this exceedingly clear.