Real-Time Weather Event Monitoring System

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Introduction

Climate change presents new risks and opportunities for the global economy. In the dynamic landscape of financial services, reliable and efficient risk management is a key success factor. A vital aspect of this involves analyzing and assessing relevant climate events to evaluate their impact on locations of interest.

In support of RBC's purpose of helping clients thrive and communities prosper, we have developed an innovative solution that automates, streamlines, and consolidates the process of monitoring weather events across Canada and identifying significance to user-defined points of interest.

Our project is designed to gather and display real-time weather event data at a national scale across Canada. This solution can empower RBC to make personalized and informed decisions, thereby enhancing their operational effectiveness.

Requirements

Real-Time
Real-time data aggregation from public sources

Performance
High-speed processing of geospatial data

Flexibility
API layer for data asset access

User-Centered
Interactive web application for geospatial analysis

Methodology

We used the agile software design and development methodology along with leveraging prototyping. Initially, we met with the main project stakeholders at RBC to discuss key aspects and requirements of the project. Our team started to break down the project into smaller and actionable tasks to maximize efficiency. Four major tasks were immediately identified: researching data sources, researching geospatial data processing tools, setting up the API for the utilization of data assets, and beginning the web interface development.

Using Zenhub and GitHub issues, we broke each of these tasks into smaller subtasks and assigned them based on individual strengths in the team. This allowed our team to effectively visualize and manage remaining sprint items and rapidly build prototypes. We used our weekly stakeholder meetings to demonstrate progress and gather feedback to improve features.

We divided our project's milestones into three sprints. During the first sprint, the team focused on creating a proof of concept that included the project's architecture and evaluating alternative solutions. In our second sprint, a full end-to-end initial application was built, and through weekly meetings with the stakeholders the functionalities were refined and upgraded. The third sprint involved adding final touches, running extensive performance tests, and overall code refactoring to make sure it is easy to extend and read.

To facilitate efficient testing and development, we created a live environment on one of the team member's local machine that everyone could access. We ensured the utilization of industry-standard version control practices using Git branches, pull requests, and code review to ensure that the code is tested and well documented.

Our Solution

Our project is a complete software implementation including an automated data aggregator, data processor, and a visual analyzer. The application provides real-time and historical insights into weather events across millions of locations of interest distributed across Canada.

Our application monitors real-time weather events, such as fires and floods, as well as nationwide and provincial alerts, drawing from various public data sources. It then performs geospatial intersections at scale to identify impacts. A key aspect of this project is its ability to analyze thousands of weather events and assess their impact on millions of locations of interest in real-time, making high performance a top priority for our application.

Disclaimer: No RBC proprietary data was used in this project.

Successes

One of our major successes for this project was the ability to perform complex geospatial queries in near real-time. Through heavy research and experimentation, we were able to leverage the right tools and algorithms, resulting in processing times of less than 15 minutes under extremely heavy input loads.

Another significant success for our application is the flexibility it offers to fit various user needs and contexts. End users can seamlessly analyze climate events through our intuitive web-based graphical interface or retrieve data in text format via our API for tailored analysis. This enhances the versatility of our platform, allowing RBC to further develop a suite of internal tools and applications by integrating them with our system according to its specific business needs.