ACSM Interactive Data Visualization Web Application

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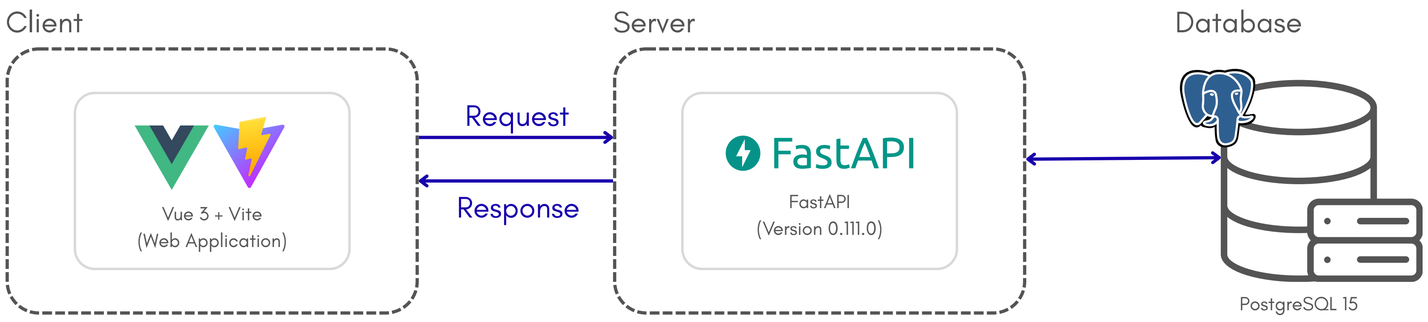
Abstract

The Aerosol Chemical Specifications Monitoring (ACSM) project measures real-time aerosol chemical composition using Aerosol Mass Spectrometry (AMS) to support air pollution analysis and atmospheric research. This study presents the development of an interactive web application to improve access to and interpretation of aerosol data. The system visualizes measurements from multiple locations and allows filtering by location, component type, and time range. Built with Vue.js and FastAPI using a RESTful API architecture, the application demonstrates reliable performance and effectively supports data exploration.

Introduction

The Aerosol Chemical Speciation Monitor (ACSM) is an advanced instrument used for real-time measurement of fine aerosol chemical composition using Aerosol Mass Spectrometry (AMS), which detects five chemical components: chloride, ammonium, nitrate, organic compounds, and sulfate. ACSM data can be analysed and applied in atmospheric science research. Therefore, the development of a web application improves access to ACSM project data. The system enables users to select and visualize specific data ranges, allowing faster and more intuitive understanding of aerosol composition.

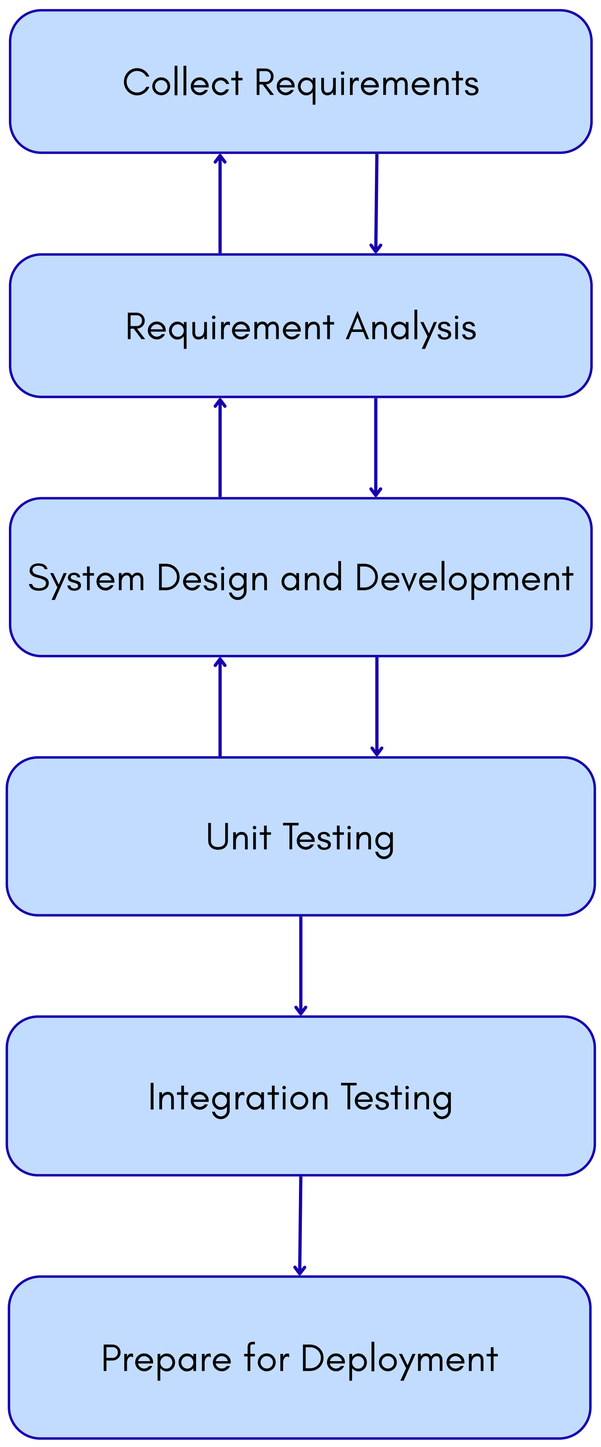
Architecture



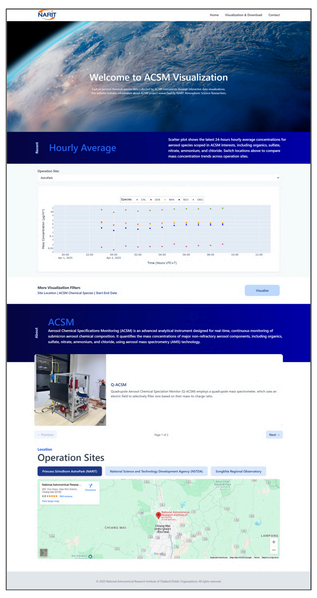
Technology

Figma, VS Code, Miniconda, PostgreSQL, Plotly, Pandas, Vue, Vite, Tailwind CSS, FastAPI, Docker

Methodology

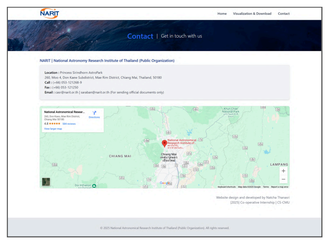


Results









Conclusion

The developed web application presents ACSM information and visualizes aerosol chemical composition data through interactive and user-friendly interfaces. Users can filter data by location, component type, and time range, as well as interact with visualizations through zooming and outlier adjustment. The system also supports exporting visualizations as images and downloading datasets in a data frame format.
System development was successful, with all functions operating correctly. User feedback indicates that the application is effective in improving data accessibility and supporting atmospheric data analysis.

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