

## Background

Micro businesses are often underserved by tools designed for larger companies. Despite their critical role in the economy, they lack access to affordable, data-driven solutions for growth and sustainability. **Alas Services**, a local Utah-based business, exemplifies this need. Challenges included scattered information, unclear service pricing, and limited operational visibility. This project addresses that gap with a tailored, accessible application.

## Definitions

- **Micro-Enterprise:** ≤10 employees; high variability, low margins, limited analytics adoption.
- **Operational Intelligence:** Real-time data used to guide business processes.
- **Role-Based Access Control (RBAC):** Security architecture for user-specific permissions and audit tracking.

## Methods

- **Framework:** Backend built using FastAPI, enabling fast development and modern RESTful APIs.
- **Deployment:** Hosted on Render's free tier, ensuring low-cost access for micro-business clients.
- **Database:** PostgreSQL schema structured for clients, addresses, services, expenses, and payments.
- **CSV Integration:** Client data and expense records imported directly into the system to initialize workflows.
- **Price Calculator:** Dynamic estimation tool using prior-year expenses and service combinations.
- **Security:** JWT-based authentication with role-based access control (RBAC) for admin and staff roles.
- **Visualization:** Dashboards created in Tableau Public, embedded for accessible visual insights, and real time information.

## Results

- **Reduced operational time** for inputting client data from ~2 hours to under 10 minutes, significantly improving efficiency.
- Embedded Tableau dashboards provided the business owner with a clear, real-time visual of operations—enabling **trend identification** and data-informed investment decisions in areas like marketing and advertising.
- **Error reduction** and automated data collection streamlined processes and minimized manual workload.
- A **centralized client database** improved visibility into client volume, preferences, and service expectations.
- The system's **modular architecture** supports scalability and adaptability across industries, while remaining customizable to the specific operational needs of each business.

## Conclusions

CAVA Solutions highlights the practical value of applying data science principles to real-world, low-resource environments. By combining modern backend development with accessible data visualization, the system empowers micro-businesses to make faster, smarter, and more confident decisions.

What began as a tailored tool for one local business has demonstrated potential for broader use—proving that scalable, modular, and data-informed systems can be built affordably and adapted to diverse industries.

Future work includes expanding the dashboard analytics, integrating predictive models for demand forecasting, and enhancing the user interface for broader accessibility.