

Project Name: Energy Consumption Analysis

Project Overview

The Energy Consumption Analysis project aims to provide a platform for analyzing energy consumption data. Users can log in to the system, view energy consumption statistics, and perform various analyses on the data. Additionally, the system integrates OpenAI to provide conversational assistance for data interpretation and navigation.

Frontend Technology Information

Framework: React

Dependencies:

@google-cloud/storage: Cloud storage integration for handling file uploads.

axios: HTTP client for making API requests to the backend.

chart.js: Library for creating interactive charts and graphs.

moment: Library for parsing, validating, manipulating, and formatting dates.

react-chartjs-2: React wrapper for Chart.js, simplifying chart integration.

react-datepicker: Date picker component for selecting dates.

react-router-dom: Library for declaratively routing in React applications.

Build Tool: Create React App

Testing Framework: Jest and React Testing Library

Backend Technology Information

Framework: Express.js

Dependencies:

@google-cloud/storage: Integration for accessing Google Cloud storage.

axios: HTTP client for making external API requests.

cors: Middleware for enabling Cross-Origin Resource Sharing (CORS).

date-fns: Library for manipulating dates.

dotenv: Library for loading environment variables from a .env file.

express: Web application framework for Node.js.

fast-csv: Library for parsing and formatting CSV data.

json2csv: Library for converting JSON data to CSV format.

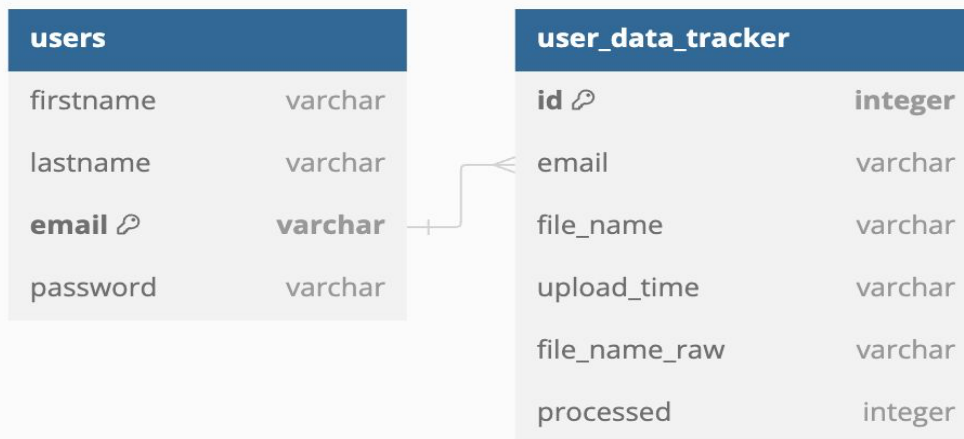
moment-timezone: Extension of Moment.js with time zone support.

multer: Middleware for handling multipart/form-data, used for file uploads.

mysql: MySQL client for Node.js.

Database: MySQL

ER diagram:



Product Features

User Authentication:

Users can log in to the system using their email and password.

Unauthorized users are redirected to the login page.

Dashboard:

Authenticated users are directed to a dashboard displaying energy consumption data.

Energy consumption data is fetched from the backend API and displayed in a list format.

Data Analysis:

Users can analyze energy consumption data using interactive charts and graphs.

Date picker allows users to select specific time ranges for analysis.

File Upload:

Users can upload energy consumption data files for analysis.

Uploaded files are processed on the backend and stored for future analysis.

API Integration:

Integration with external APIs allows fetching additional data for analysis.

Data from external APIs can be combined with internal data for comprehensive analysis.

OpenAI Integration:

Users can interact with a chatbot to ask questions and get personalized insights about their bills, ways to reduce energy consumption, energy-saving tips, and recommendations.

Non-Functional Requirements**Performance:**

The system should handle concurrent user requests efficiently.

Response times for data retrieval and analysis should be minimal.

Security:

User authentication should be secure, with passwords stored securely using hashing algorithms.

APIs should be protected against unauthorized access using authentication tokens or API keys.

Scalability:

The system should be designed to scale horizontally to accommodate increasing user loads.

Database architecture should support efficient data storage and retrieval as the dataset grows.

Reliability:

The system should be robust and resilient to failures, with proper error handling and logging mechanisms in place. Regular backups of data should be performed to prevent data loss.

Usability

The user interface should be intuitive and user-friendly, with clear navigation and informative feedback messages. Error messages should be descriptive and actionable, guiding users to resolve issues effectively.

Milestones

- Setup and Database Integration
- File Upload and Basic Data Processing
- Integration with OpenAI for Advanced Analysis

- User Interface Enhancements and Visualization
- Testing, Optimization, and Deployment

Market Place:

Energy Industry Solutions Platforms:

Marketplaces catering to energy industry solutions, where businesses and consumers seek tools for optimizing energy consumption, would be interested.

Tech and Sustainability Marketplaces:

Platforms focusing on technology solutions for sustainability and energy efficiency would find value in offering this product.

Data Analysis and Insights Platforms:

Marketplaces centered around data analysis and insights could benefit from including energy consumption analysis tools for their users.

Selling Points:

Advanced Data Analysis:

Offers advanced data analysis capabilities using machine learning and OpenAI, providing deeper insights into energy consumption patterns.

User-Friendly Interface:

Features a user-friendly interface for uploading data, visualizing results, and accessing insights, making it accessible to a wide range of users.

Customizable Solutions:

Provides customizable solutions tailored to the specific needs of businesses and consumers, allowing for flexible analysis and reporting.

Integration and Compatibility:

Integrates seamlessly with existing energy management systems and data sources, ensuring compatibility and ease of adoption.

Cost-Effective Energy Optimization:

Enables cost-effective energy optimization by identifying inefficiencies and suggesting actionable recommendations for improvement.

Scalability and Performance:

Offers scalability to handle large volumes of data and ensures high performance, making it suitable for businesses of all sizes.

Compliance and Reporting:

Helps businesses meet regulatory compliance requirements by generating accurate reports on energy consumption and efficiency metrics.