# Technical Report: Development of a Product Comparison and Review Aggregator App

## 1.Introduction

In the digital age, the plethora of products and online retailers can overwhelm consumers, making it challenging to make well-informed purchasing decisions. Our proposed app aims to address this challenge by providing a comprehensive solution for product comparison and review aggregation. Leveraging advanced technologies such as the Google Cloud Platform, VueJS and Flask, our app empowers consumers with real-time pricing information and unbiased product reviews sourced from multiple online retailers.

## 2.Case Study

The demand for a product comparison and review aggregator app is evident across various industries and demographics. Here are a few examples of scenarios from multiple industries:

- **Electronics**: In the electronics industry, consumers often face a multitude of choices when purchasing gadgets such as smartphones, laptops, and televisions. With numerous models available across different retailers, users may struggle to find the best deal. Our app provides a one-stop solution for comparing prices and reading reviews from reputable sources, enabling users to make informed decisions based on their preferences and budget.

- **Fashion**: Fashion enthusiasts frequently browse online platforms for the latest trends and clothing styles. However, navigating through various e-commerce websites to find the best price and quality can be time-consuming. Our app simplifies this process by aggregating product listings and reviews from fashion retailers worldwide, allowing users to discover the latest trends, compare prices, and make purchases with confidence.

- **Home Appliances**: When shopping for home appliances such as refrigerators, washing machines, and vacuum cleaners, consumers prioritize factors such as performance, energy efficiency, and durability. Our app not only provides price comparisons across different retailers but also offers insights from verified users who have purchased and used the products, helping users assess the overall value and suitability of each appliance for their needs.

- **Travel**: Beyond tangible products, our app also extends to the travel industry, where users can compare prices and read reviews for flights, hotels, and vacation packages. By aggregating data from travel booking websites and review platforms, our app empowers users to plan and book their travel itineraries with ease, ensuring they get the best deals and experiences.

- **Health and Wellness**: With the rise of online wellness products and services, consumers are increasingly turning to e-commerce platforms for supplements, fitness equipment, and health-related services. Our app provides a trusted resource for comparing prices and evaluating the efficacy of wellness products based on user reviews and expert recommendations, helping users make informed choices for their health and well-being.

## 3.Existing Solutions

While several existing solutions offer functionalities similar to our proposed product, they often fall short in providing a seamless user experience and comprehensive data coverage. Traditional price comparison websites typically focus on a narrow range of products or retailers, limiting their usefulness to consumers seeking niche or specialized items. Moreover, these platforms may rely on outdated data sources or lack real-time updates, resulting in inaccurate pricing information.

Furthermore, review aggregation platforms may suffer from biased or incomplete reviews, undermining their credibility among users. Some platforms prioritize quantity over quality, leading to a proliferation of spam or fake reviews that erode trust in the platform's recommendations. Additionally, concerns regarding data privacy and security have been raised with some existing platforms, highlighting the need for a trustworthy and user-centric solution.

## 4. Technical Details

Architecture:
Our product adopts a microservices architecture, providing scalability, flexibility, and resilience. The architecture consists of:

- **Frontend**: Developed using Vue.js, the frontend offers a dynamic and interactive user interface, providing users with a seamless experience as they navigate the app and access relevant information. Vue.js was chosen for its simplicity, reactivity, and extensive ecosystem of plugins and libraries, enabling rapid development and iteration of frontend components.

- **Backend**: Leveraging Python and Flask, the backend handles data processing and storage efficiently, facilitating seamless integration with third-party APIs and ensuring smooth operation of the app. Python was selected for its versatility, ease of use, and robust ecosystem of libraries for data processing and machine learning. Flask, a lightweight and extensible web framework, was chosen for its simplicity and flexibility, allowing for rapid development and deployment of backend services.

- **Integration**: Axesso RapidAPI serves as the backbone for retrieving real-time product pricing data from various online retailers, ensuring comprehensive coverage and accuracy. Axesso RapidAPI provides a unified interface for accessing a vast repository of e-commerce data, streamlining integration with multiple data sources and minimizing development effort.

- **Sentiment Analysis**: Powered by AI and natural language processing (NLP) algorithms, sentiment analysis is performed on user reviews to generate an overall product rating, providing valuable insights to users and enhancing their decision-making process. NLP algorithms analyze text data to extract sentiments and opinions, enabling the app to aggregate and summarize user feedback effectively.

Technologies:

Our product leverages a combination of modern technologies to deliver a seamless and feature-rich user experience:

- **Google Cloud Platform**: Selected for its scalability, reliability, and extensive suite of services tailored for app development, Google Cloud Platform forms the foundation of our app's infrastructure. Google Cloud Platform provides a range of cloud services for computing, storage, and machine learning, enabling us to build and deploy scalable and reliable applications with minimal infrastructure management.

- **Axesso RapidAPI**: With access to a vast repository of e-commerce data, Axesso RapidAPI enables seamless retrieval of product pricing information from multiple online retailers, ensuring that users have access to the most up-to-date and accurate data. Axesso RapidAPI offers a unified interface for accessing data from various sources, simplifying integration and reducing development time and effort.

- **Vue.js**: Chosen for its simplicity, reactivity, and extensive ecosystem of plugins and libraries, Vue.js powers the frontend of our app, delivering a responsive and engaging user experience across various devices and platforms. Vue.js enables rapid development and iteration of frontend components, allowing us to build dynamic and interactive user interfaces with ease.

- **Python and Flask**: Utilized for backend development, Python and Flask enable efficient data processing and integration with third-party APIs, ensuring smooth operation and real-time updates of the app. Python's versatility and ease of use make it well-suited for a wide range of backend tasks, from data processing and analysis to web development. Flask, a lightweight and extensible web framework, provides a simple and flexible architecture for building RESTful APIs and web applications, allowing for rapid development and deployment of backend services.

- **Natural Language Processing (NLP)**: Employed for sentiment analysis of user reviews, NLP algorithms analyze text data to extract insights and sentiments, providing users with a comprehensive understanding of product quality and customer satisfaction. NLP enables the app to aggregate and summarize user feedback effectively, helping users make informed decisions based on the collective experiences of other users.

## 5.Marketing Strategies

Our marketing strategy aims to drive user engagement, increase app adoption, and foster long-term user loyalty. Key approaches include:

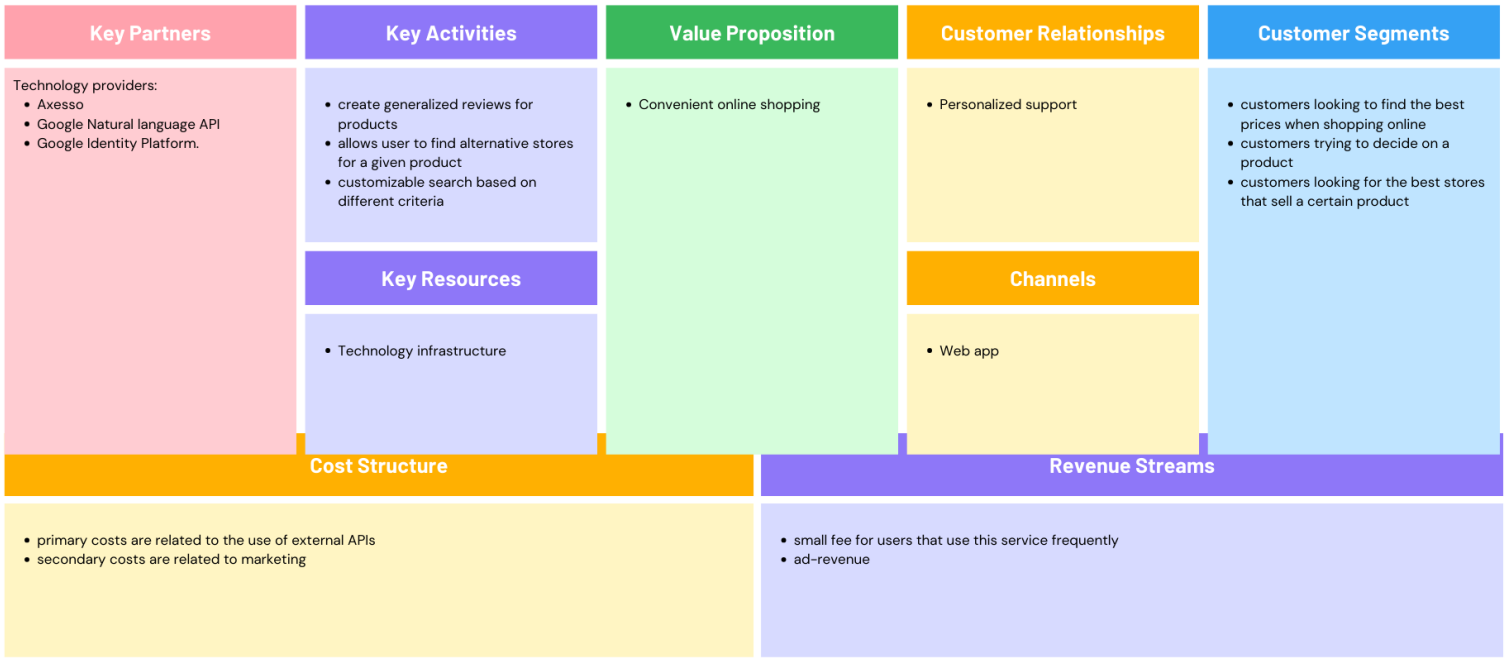
- **Content Marketing**: Creating engaging and informative content such as blog posts, articles, and videos that highlight the benefits of our app, offer product recommendations, and provide valuable shopping tips and insights. By establishing ourselves as a trusted source of information and advice, we aim to attract and retain users who value our expertise and guidance.

- **Social Media Engagement**: Leveraging social media platforms such as Facebook, Instagram, and Twitter to connect with our target audience, share relevant content, and engage in conversations around shopping trends, product recommendations, and user experiences. By actively participating in social media discussions and building a community of engaged followers, we can increase brand awareness and drive traffic to our app.

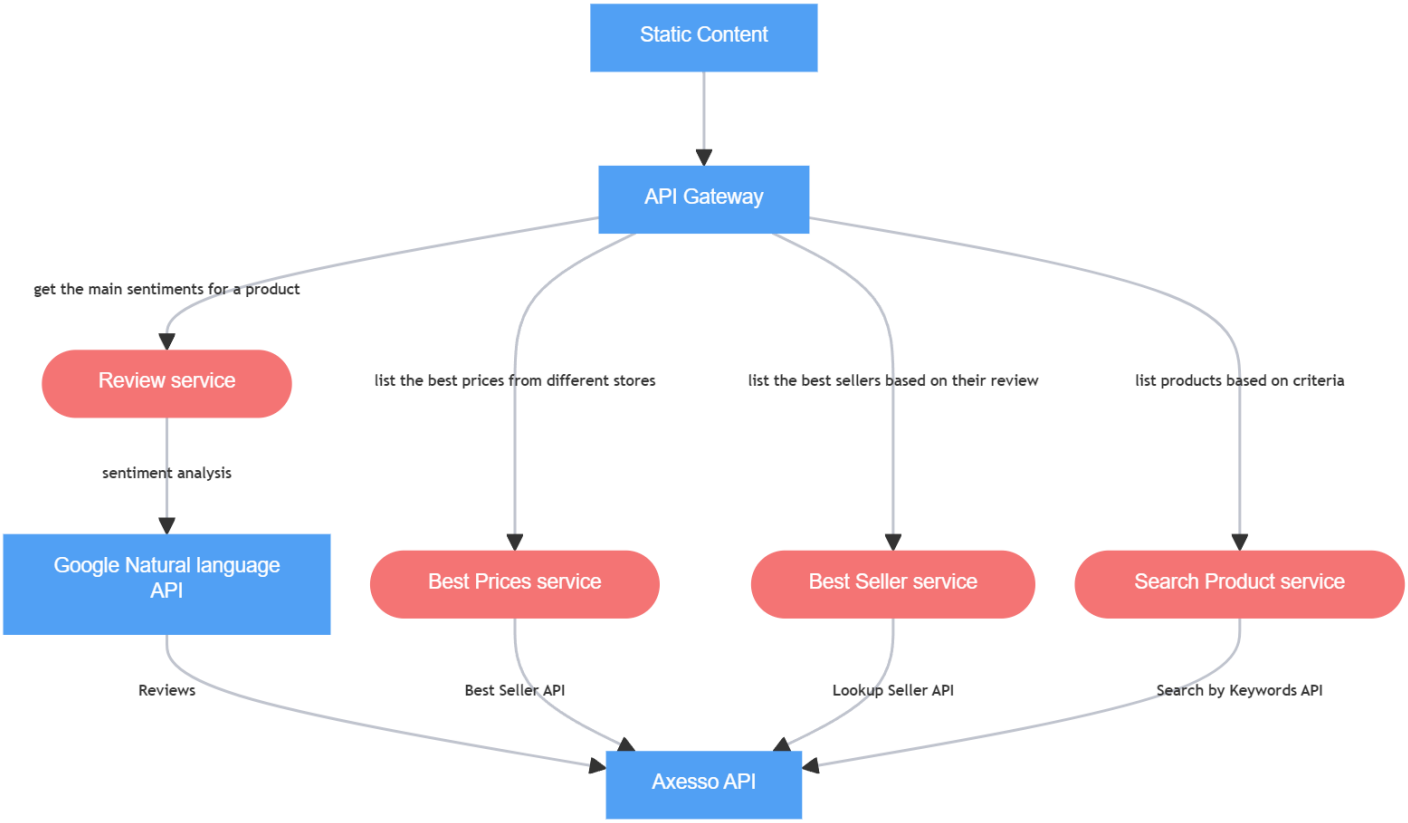
- **Influencer Partnerships**: Collaborating with influencers and industry experts who align with our brand values and target audience demographics to promote our app through sponsored content, product reviews, and social media endorsements. By leveraging the reach and credibility of influencers, we can effectively reach new users and generate buzz around our app, driving app downloads and user engagement.

- **Email Marketing**: Implementing targeted email campaigns to communicate with our user base, deliver personalized product recommendations, and promote special offers and discounts. By segmenting our email list based

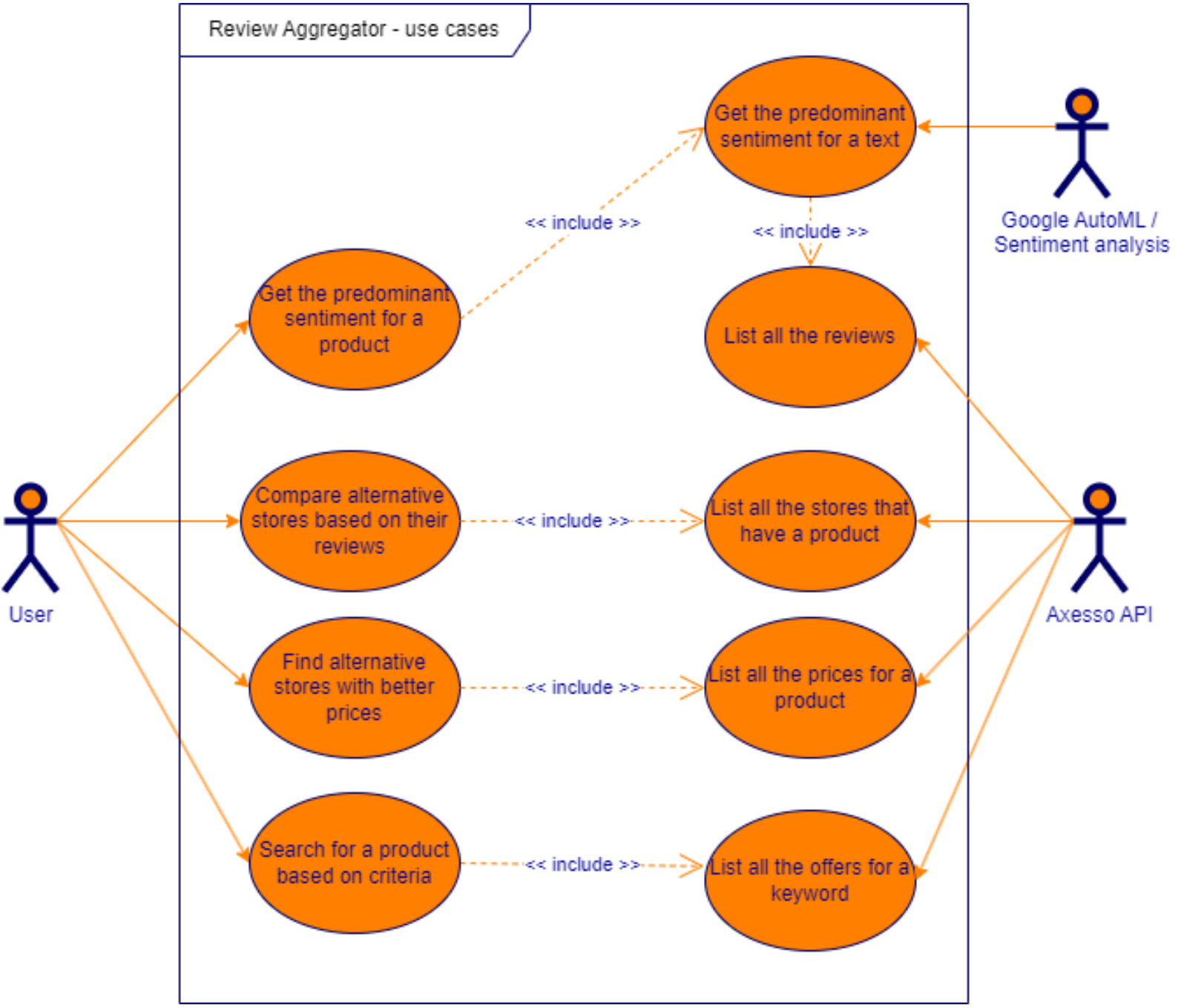
## 6. Business model



## 7. Architectural diagram



## 8. Use case diagram




## 9. APIs

### 1. Endpoint: `/get-history`

- **Method:** GET
- **Description:** Retrieve search history for a user.

- **Request Parameters:**
  - **uid** (required): User ID for which search history is to be retrieved.
- **Response:**
  - **200 OK:** Returns a JSON array containing search history entries.
  - **404 Not Found:** Returns an error JSON object if the user ID is missing or invalid.

## 2. Endpoint: `/lookup-product`

- **Method:** GET
- **Description:** Look up product details using its URL, including sentiment analysis of reviews.
- **Request Parameters:**
  - **url** (required): URL of the product on Amazon.
  - **uid** (optional): User ID for which the search entry is to be added.
- **Response:**
  - **200 OK:** Returns a JSON object containing product details, sentiment analysis of reviews, and average rating.
  - **400 Bad Request:** Returns an error JSON object if the product URL is missing or invalid.
  - **404 Not Found:** Returns an error JSON object if the product is not found on Amazon.

## 3. Endpoint: `/lookup-seller-prices`

- **Method:** GET
- **Description:** Look up seller prices for a product on Amazon by its URL.
- **Request Parameters:**
  - **url** (required): URL of the product on Amazon.
  - **sortedBy** (optional): Sorting criterion for seller prices (`price` or `sellerRating`).
  - **minPrice** (optional): Minimum price filter.
  - **maxPrice** (optional): Maximum price filter.
  - **order** (optional): Sorting order (`ascending` or `descending`).
- **Response:**
  - **200 OK:** Returns a JSON array containing seller prices sorted according to the specified criteria.
  - **400 Bad Request:** Returns an error JSON object if the product URL is missing or invalid.

- **404 Not Found:** Returns an error JSON object if the product is not found on Amazon.

## 4. Endpoint: `/search-by-keyword`

- **Method:** GET
- **Description:** Search for products on Amazon by keyword.
- **Request Parameters:**
  - **keyword** (required): Keyword to search for.
  - **minPrice** (optional): Minimum price filter.
  - **maxPrice** (optional): Maximum price filter.
  - **order** (optional): Sorting order (`ascending` or `descending`).
- **Response:**
  - **200 OK:** Returns a JSON array containing search results sorted according to the specified criteria.
  - **400 Bad Request:** Returns an error JSON object if the keyword is missing.
  - **404 Not Found:** Returns an error JSON object if no products are found for the given keyword.