

## **System Design Explanation:**

The YouTube Comment Sentiment Analysis System consists of several key components. The Chrome Extension serves as the client interface, allowing users to trigger sentiment analysis for YouTube videos and communicating with the Backend Server through POST and GET requests. The Backend Server handles processing tasks, including managing API interactions, checking the Database to avoid redundant analyses, sending comments to the LLM Model for sentiment classification, and storing results. The YouTube API Gateway bridges the server and YouTube, handling API requests, load balancing, and rate limiting. The LLM Model analyzes comments using NLP techniques and returns sentiment summaries. The Database stores raw comments and sentiment results, optimizing performance by checking for existing analyses. Overall, users initiate requests via the Chrome Extension, and after processing, receive sentiment summaries directly in their browser.