**Wild Me Writing Sample**

**How would you build a search engine like Google?**

To build a search engine like Google, we would need to use a variety of architecture and design patterns. Here are some of the key components and design patterns that would be involved in building a search engine like Google:

**Web crawler:** The web crawler is a program that visits web pages, retrieves their content and extracts the relevant information. It typically uses a "breadth-first" crawling strategy, which means it starts with a seed set of URLs and then follows all the links on each page to discover new pages to crawl. The web crawler is typically implemented as a distributed system, with multiple crawler instances running in parallel to improve performance and scalability.

**Index:** The index is a large database that stores the information extracted from the web pages that the crawler has visited. It is typically implemented using a distributed key-value store, such as Apache Hadoop or Apache Cassandra, to handle the massive scale of the index. The index is designed to be highly available and fault-tolerant, with multiple replicas of each index entry to ensure that the data is always accessible.

**Ranking algorithm:** The ranking algorithm is the core of a search engine. It is a complex piece of software that determines the relevance of each page in the index to a given search query. The ranking algorithm is typically implemented using machine learning techniques, such as logistic regression or support vector machines, to learn from user behavior and improve the accuracy of its results over time.

**User interface:** The user interface is the part of the search engine that users interact with. It typically consists of a search bar where users can enter their queries, as well as a list of results that the search engine has generated based on those queries. The user interface is typically implemented as a web application, with the front-end written in HTML, CSS, and JavaScript and the back-end implemented using a web framework such as Ruby on Rails or Django.

**Distributed systems:** Building a search engine like Google requires a distributed systems architecture, with multiple components running on multiple machines and communicating with each other over a network. This architecture allows the search engine to scale horizontally, with more machines added as needed to handle the increasing volume of search queries. It also allows the search engine to continue operating even if individual machines fail, with other machines taking over the workload of the failed machines.

**Continuously improve and update:** Building a search engine is an ongoing process. As the web changes, the search engine must continue to crawl new pages and update its index. The ranking algorithm must also be regularly updated to improve its performance and take advantage of new information. Additionally, the search engine must be continuously monitored and tested to ensure that it is functioning correctly and providing relevant results to users.