



# Team Quadeyes

A team of passionate young developers and  
product managers from IIT Varanasi



# Team Details

## Team Members:

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- Bhav Khurana
- Avinash Ranjan

**About Us:** We all are pursuing B.Tech. in Computer Science and Engineering from IIT (BHU) Varanasi. We are super excited to be here!

**Theme:** Theme 1 – Shopping Experience with Generative AI + AWS



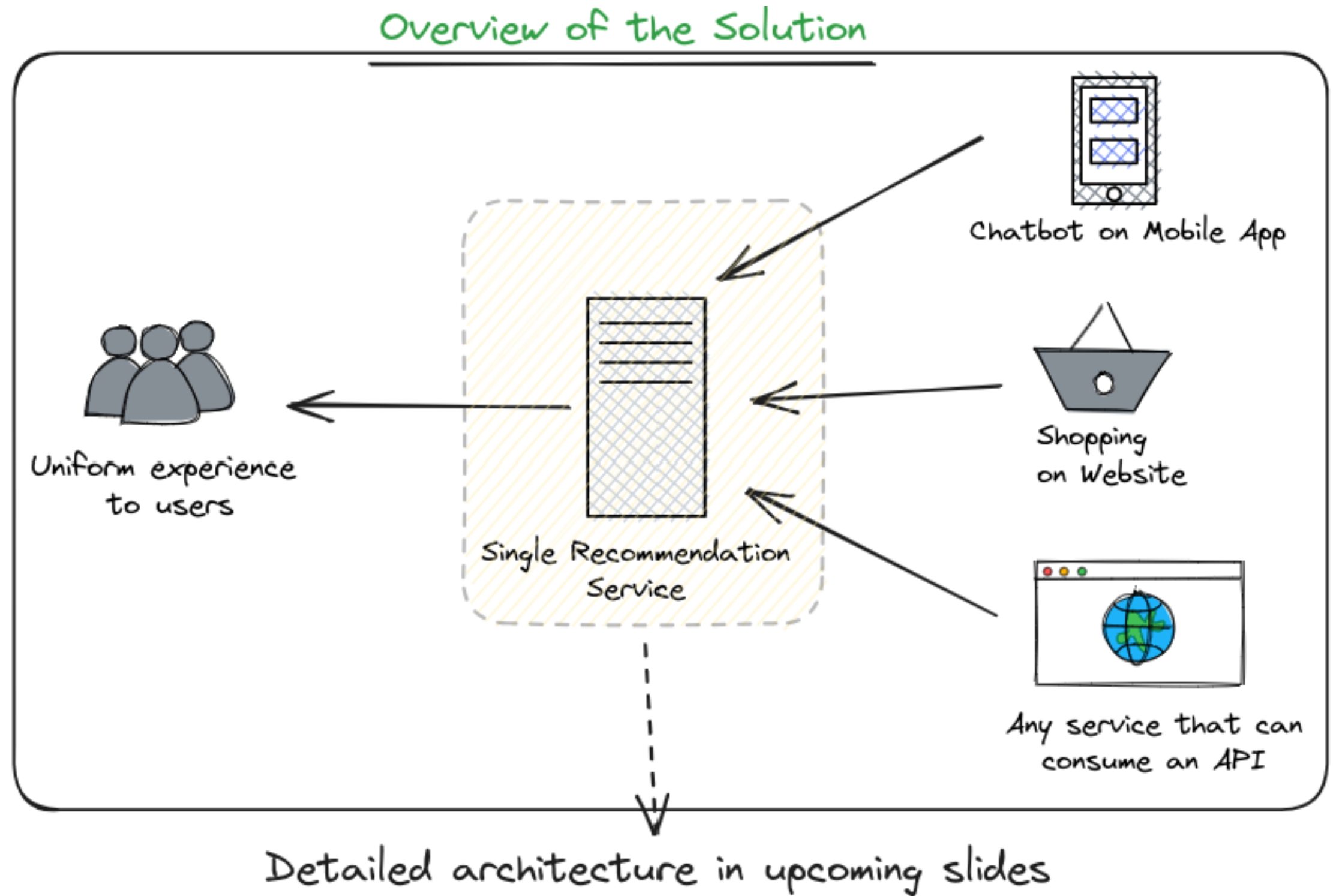
# Problem Statement

- Chatbots and e-commerce interactions often lack personalization and feel mechanistic. Users are typically encouraged to purchase items similar to their previous selections, and there's a lack of user profiling for targeted product recommendations.
- Also, user data is fragmented across various services within large companies like Amazon. A centralized system capable of seamlessly accessing and aggregating data from these services to enhance the user experience would revolutionize this. This must be accompanied by a design that minimizes bandwidth and on-disk storage.
- Further, the prevailing shopping experience is user-driven, where users must initiate actions, triggering predefined algorithms. To counter this limitation, companies have resorted to mass notifications, which can be impersonal and spam-like. There's a growing imperative for an intelligent system that discerns which services to promote to individual users, employing sophisticated strategies for timing and delivery.

# Solution

## Proposed Solution Overview

We want to create an AI-powered shopping-cum-virtual assistant that can bridge the gaps described above. The assistant would be realized as an API so that the same can be integrated into multiple forms with all the existing services: chat-bot, recommendation engine with platforms like Amazon, Audible, Amazon Music, Prime, etc. This would provide uniformity across all the services and platforms and make the user experience journey decoupled with the client interface, leaving room for expansion.

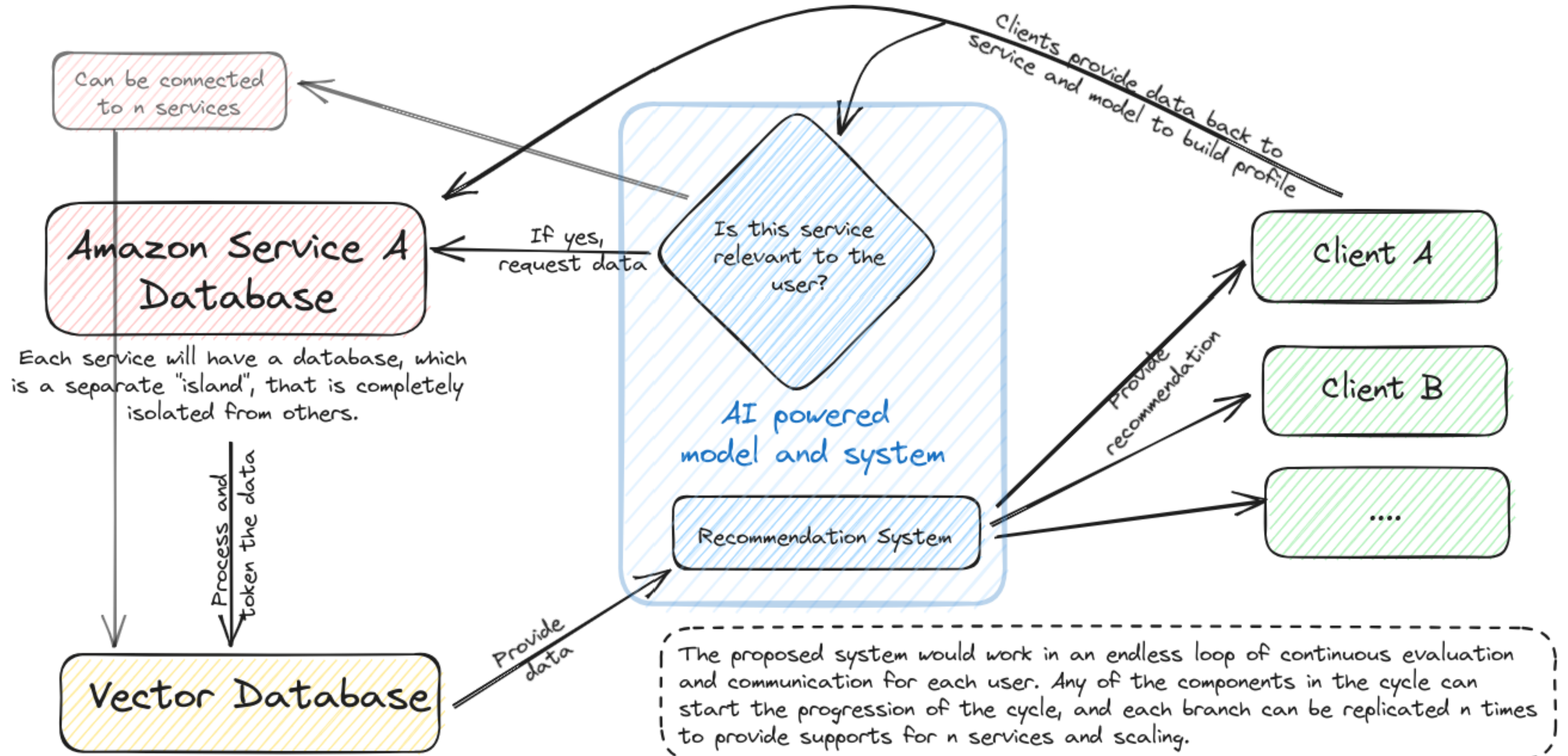


# Solution: Different Components

- **Centralized Data Integration using Vector Databases:** Implement vector databases to centralize and efficiently handle user data from Amazon services, including professional and personal information. This permits the creation of a uniform data repository. We plan to leverage the performance of memory safety of Rust-powered open-source vector databases like Qdrant to analyze and tokenize the data.
- **AI-Powered User Profiling:** Create machine learning models that utilize the centralized data to create detailed user profiles. These models consider professional and lifestyle characteristics in addition to likes and dislikes. This profile would be the most holistic representation of the user and would determine all the Amazon services that can benefit the user.
- **User Interface:** We would be building the proof-of-concept with a simple Web-based client, but these clients can be realized in any way that allows a simple API to be made.
- **Real-time Interaction - Web Sockets:** The centralized API server would use web sockets to allow clients to communicate in real time. This allows for immediate answers and dynamic user engagement. Server-side streaming would also eliminate the request-response nature of the communication.



## How does the solution work?



# Model Architecture

## User Data Repositories

### WEB STORE ISLAND

Amazon Webstore

Processing shopping and browsing history to build user profile

### MUSIC ISLAND

Amazon Music

Sentiment Analysis to predict mood of the user at a particular time

### FIRESTICK ISLAND

Amazon FireStick

Viewing history tracking algorithms and profile building algorithms for recommendations

## Amazon Product Data Repositories

Used to browse all the available products and services that can be delivered to the user

Amazon Catalogue

Used to show available music and series that can be made available on request

Amazon Prime

Books and magazine data and summaries

Kindle

Central Model

Services supply data to a central model to build a holistic profile

Request data to provide recommendations

Provide answer to user queries



# Architecture Discussion

## Advantages of the proposed architecture

### 1. Decoupling of the micro-services

Can add new user data repositories or Amazon data repositories in a standardized format, ensuring scalability

### 2. Removal of request-response nature

The user data sources would broadcast new information about user profiles whenever they receive new data. Similarly, the Amazon services can broadcast data to model whenever they are updated. Leads to a broadcast based system, where user may get recommendations even without requests

### 3. Fetch only the data that you need

Data pertaining to a service would only be requested for an user if he/she actually uses it/or has a need for it. Reduces bandwidth and storage costs

### 4. Bring it all!

We can integrate even the niche services of Amazon here, which are never used. The user profile would determine if the service can in any way be monetized and sold to the user.

## BRING ALL THE NICHE SERVICES

We know that most people won't use them, but those who do, wouldn't be able to resist the ease this integration would provide

### Amazon Academy

For students and competitive exams aspirants

### AWS

Promote AWS and provide support from developer documentation right in the chat model for developers and software engineers

### LightSail

Virtual private servers and self hosting solutions

### Amazon Chime

Meeting platform and video conferencing recommendation and reminders

### Pantry and Fresh

Provide recipes from you fridge content and grocery reminders

### Audible

Integrate audio books into the daily life of users like hobby or commute

And so many more .....

### Amazon Pharmacy

Keep track of the user's prescriptions and medicines, and manage their medications



# Solution: Why does it work?

- **How do we solve the mentioned problems?**

- Each service will be responsible for maintaining its data (on its **island**). Still, our model would act as the central confluence point of all of them, determining which service is relevant to which user, thus bringing about data unification.
- A textual bot trained on this data provides consumers with personalized and context-aware service recommendations, resulting in a seamless and scalable user experience. The system would prioritize user behavior and nature rather than his immediate actions.
- As the model would be in charge of the conversation, it would no longer be necessary for the user to begin interaction. By analyzing the user profile, the model can determine the times for most active engagement and bring a more human-like touch to the conversations, not simply a Q&A.

- **What are the impact metrics to judge the solution?**

- Track user engagement through active user numbers and session duration
- Key recommendation metrics, including click-through and conversion rates, will indicate personalized suggestions' success.
- Feedback loops will enable continuous improvement based on user needs.

# **Solution: Ease of Implementaion and Scalability**

- **Ease of implementation**

- While implementing the solution may be challenging, we are confident that we can successfully execute it within the specified time frame with our proficiency in various technology stacks.
- The two-step approach would give users highly personalized and relevant suggestions based on the data fetched from various Amazon services, enhancing shopping experience.

- **Extent of Scalability/Usability**

- ML models can be scaled to larger datasets and complex tasks via distributed computing.
- Improved performance in Rust results in faster application response times, enhancing user experience.
- Vector databases scale horizontally to manage growing volumes of time-series data efficiently.
- Real-time communication using web sockets provides instant updates and notifications, enhancing user engagement and interaction.



# Societal Impact/Novelty

- Incorporating professional and lifestyle factors into user profiles can result in more **comprehensive and accurate user profiles**, moving beyond simple likes and dislikes. This can lead to more personalized recommendations and services.
- This method prioritizes user privacy by **centralizing data sources** and having the model request data from services. It **lessens the need for broad data exchange and lowers the privacy issues** connected with user information consolidation.
- There is potential for **decreasing information overload** with an intelligent system that recognizes user context and wants. Users may obtain more relevant and timely information, allowing them to make better use of their time and resources. In the digital era, this can positively impact productivity and well-being.
- Having a strong personalized experience for consumers would further help Amazon in **strengthening it's brand identity**, thus securing it's name in the household worldwide.





# Future Scopes and Roadmap

- As these systems advance in sophistication, there will be a greater emphasis on **ethical AI and data protection rules**. Obtaining the users' consent on the collected, stored, processed, and aggregated data may be a sensitive route to navigate. Thus, **enhanced data security and encryption** would be necessary to prevent accidental leakage and attacks.
- AI systems that not only analyze professional and lifestyle factors but also **react to changing user preferences in real-time**, giving hyper-personalized experiences, may be developed in the future.
- The technology collects massive volumes of user data over time. This information can be used to get significant insights into industry trends, user behavior, and new prospects, permitting **data-driven decision-making and strategy optimization**.
- Integrating **sentiment analysis** capabilities to understand customer emotions and feedback and developing multilingual support would cater to a diverse customer base. These would not only help us to serve our customers better but also improve their quality of life by ensuring that the content that affects their sentiments negatively is least displayed to them.



# Thank You!

We look forward to hearing from you soon!