IDEA DESCRIPTION:

We propose a solution to provide users the capability to interact with Kotak Mahindra Bank's virtual assistant **Keya** using a voice interface in multiple Indian regional languages:

- We will be developing a **Progressive Web Application (PWA)** using React - a cross-platform and cross-browser application which resides on the web but delivers native-application-like experience to users – where Keya will reside.

- The PWA will have a GUI similar to chat UI with text-based cues for selecting the choice of language followed by text-based cues for selecting the type of banking service the user would like to avail.

- Users will be given the option to interact with Keya using either text based messages or voice commands. Voice based interface can be activated by clicking on the "**Speak**" button placed beside the text bar.

- Keya would work on the following model:

    Step 1: Users will be prompted to select their choice of language for communication using text based cues and voice message. Users can now decide to either interact using text or voice commands. We'll be using **Google Speech API** to allow Keya to interact in multiple languages.

    Step 2: On user clicking the "Speak" button, Keya will be listening for user's voice constantly and transcribing voice to text, writing it into input field automatically using **Google Speech API (Speech-to-Text)**.

Step 3: HTTP POST request will be used to submit the input string to our Deep Learning model hosted on **Google Cloud.**

Step 4: NLU (Natural Language Understanding) and Deep Learning techniques will be applied on input string to understand what the user wants (Intents) and to look for keywords (Entities). Intelligent tagging and decision making serve for interpreting user's request. Our model will handle various banking related customer requests, process it and reply it with appropriate voice output using **Google Natural Language API**.

 Step 5: The output text will be converted into speech using **Google Speech API (Text-to-Speech)**.

- In case of users opting to use text messages to communicate with Keya, all the steps remain the same with the exception of need to convert speech-to-text and text-to-speech.
- As of now Keya only supports enquiries and services related to Credit Card, Debit Card and Savings/Current Account, we plan on extending Keya's abilities to include:
    1) All the services included in **Kotak Mahindra's Banking on WhatsApp**.
    2) Searching for past transactions and sorting them.
    3) Scheduling a meeting at the nearest Kotak Mahindra Bank.
    4) Viewing bills and scheduling payments.
    5) Transferring money between accounts.
    6) Helping users adopt better financial decisions by analyzing their habits using historical data and applying Deep Learning Models on it.
    7) Suggesting offers to users.
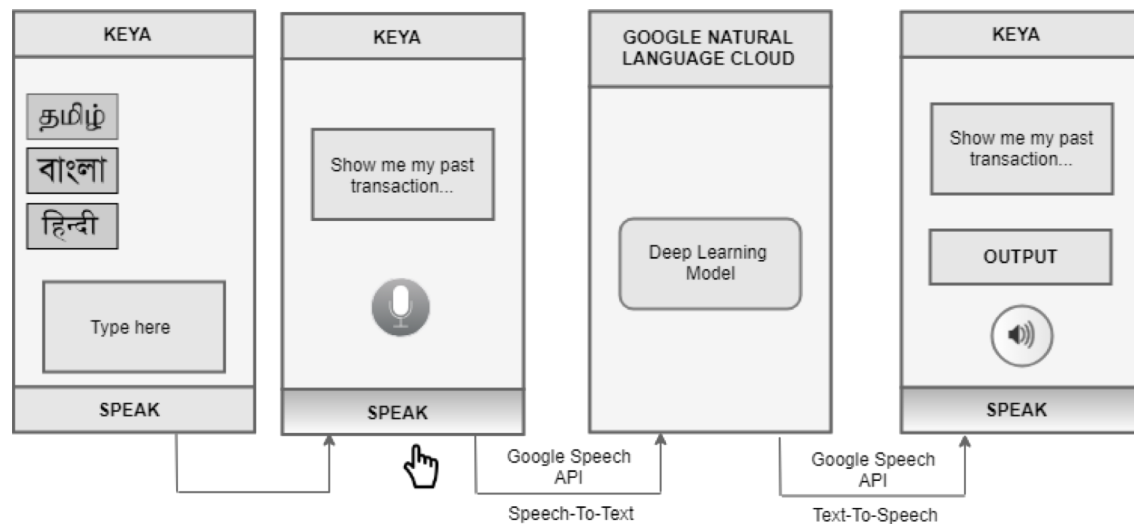
TECHNOLOGY STACK:

- **React** - Used to create Progressive Web Application (front-end)
- **Keras** - Neural Network Library to deploy deep learning models for understanding user's intent (banking relates request).
- **Google Speech-to-Text** - Google Speech-to-Text enables developers to convert audio to text by applying powerful neural network models in an easy-to-use API. The API recognizes 120 languages and variants to support global user base.
- **Google Text-to-Speech** - Google Text-to-Speech enables developers to synthesize natural-sounding speech with 30 voices, available in multiple languages and variants.
- **Nginx/Apache HTTP Server** - Load Balancer for deploying deep learning model to cloud.
- **Google Cloud Platform/AWS/Microsoft Azure** – Deploying deep learning models.
- **Google Natual Language** - Google Natural Language reveals the structure and meaning of text both through powerful pretrained machine learning models in an easy to use REST API and through custom models that are easy to build with AutoML Natural Language.
- **Axios** - Promise based HTTP client for the browser.
- **Node.js** – For interacting with database.

Use Case:

- This application can be used by users looking to avail banking services or get their enquiries clarified online. As its interface will be very minimalistic (one-touch based model), intuitive and engaging it can targeted specifically to cater to non-tech savvy users.
- This application can also be setup on tablets, screens, etc. in banks and help automate the workflow in banks.
- Banking services that users can avail in the application are:
    1) Helping users manage their spending.   2) Searching for past transactions and sorting them.
    3) Scheduling a meeting at the nearest Kotak Mahindra Bank.
    4) Viewing bills and scheduling payments.   5) Transferring money between accounts.
    6) Suggesting offers to users.
    7) Enquiries related to Credit Card, Debit Card and Savings/Current Account.

Showstoppers:

- Progressive Web Application used in this project thus ensuring **reliability, engagement and quick response.**   The interface will be extremely minimalistic and intuitive.
- Introducing **personalization** by analyzing users' habits using historical data and applying deep learning models on it to give personalized outputs.
- Adding **new capabilities to Keya**: Helping users manage their spending, Searching for past transactions and sorting them, etc. (mentioned in Use Case)
- **Google Speech-to-Text API** used to convert speech-to-text. It recognizes 120 languages and helps extend the capabilities of Keya.
- **Google Text-to-Speech API** used to convert text-to-speech. It helps synthesize natural-sounding speech with 30 voices, available in multiple languages and variants.
- **Google Natual Language** reveals the structure and meaning of text both through powerful pretrained machine learning models in an easy to use REST API.