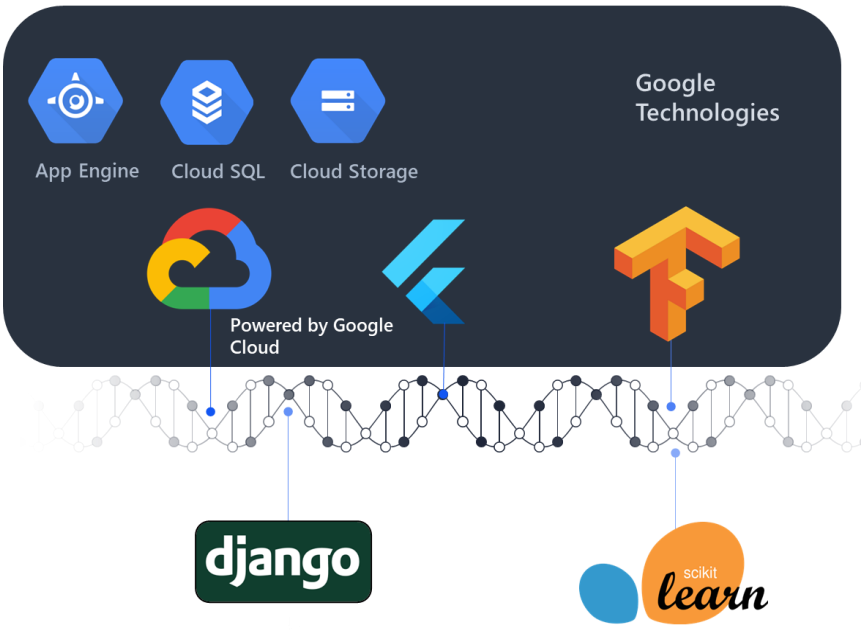
Components and Implementation

Leveraging Specific **Products and Platforms** for Enhanced Functionality and Value

Products & Platforms Used



Google Technologies	
Technology	**Usage**
Google Cloud SQL	1. **User Profile Management:** Storing and managing user profiles with medical history. 2. Storing **appointment details** for users to schedule and manage their appointments. 3. **Diagnosis History Analysis**: Storing & analyzing users diagnosis history to track patterns. 4. **Helpline Information and Suggestions**: Storing helpline information and suggestions for users seeking mental health support & fetch on diagnosis. 5. **Secure Authentication and User Management:** Storing and managing user credentials securely for authentication purposes with django's SHA algorithm.
Google Cloud Storage	1. Storage of large-scale healthcare data, including **static, and dynamic** files. 2. Integration with Orchid's data analytics and **machine learning pipelines** to process and analyze healthcare data. ML models are retrieved from GCS.
Google App Engine	1. Hosting and deployment of Orchid's web application, providing a **scalable and reliable** platform for users to access services. 2. Managing user requests, handling backend logic, and delivering dynamic content for a seamless user experience. 3. Scalable & automatic resource provisioning to handle fluctuating user traffic and workload.
TensorFlow	**Mental Health Analysis**: Utilizing TensorFlow's machine learning capabilities to analyze behavioral patterns, symptoms, and other factors for mental health scoring. After that we use Cloud SQL to fetch helplines and suggestions based on score.
Flutter	**Mobile App Development:** Utilizing Flutter's cross-platform framework to develop the Orchid mobile application, providing a seamless user experience across iOS and Android devices.
Gmail	Leveraging Gmail's SMTP service to send automated email notifications to users and healthcare experts for various functionalities in the platform. Appointment Booking: Integrating Gmail's SMTP service to send automated appointment confirmation and reminder emails to both users and healthcare experts for seamless appointment scheduling.

Other Technologies	
Technology	**Usage**
Django	1. **Web Development**: Utilizing Django as a high-level Python web framework for developing the backend of the Orchid healthcare platform, including user management and data processing. 2. **Secure Authentication:** Implementing robust authentication mechanisms using Django's built-in features, such as user registration, login, and password hashing, to ensure secure access. 3. **Data Modeling and Database Management:** Leveraging Django's Object-Relational Mapping (ORM) to define data models ensuring efficient data storage and retrieval. 4. **Integration of External Services:** Integrating Django with external services, such as Google Cloud SQL for database management, to enhance the functionality and scalability of the platform.
scikit-learn	1. **Machine Learning Models:** Utilizing scikit-learn's comprehensive machine learning library to develop predictive models for NCD diagnosis, and autism spectrum disorder detection. 2. **Feature Extraction and Preprocessing:** Leveraging scikit-learn's preprocessing capabilities to extract relevant features from healthcare data and pre-process them for accurate model training.

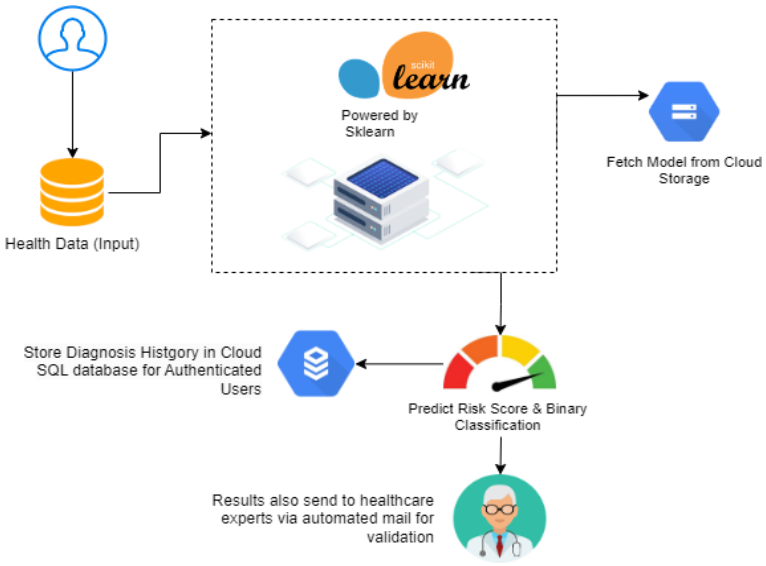
Implementation of Product & Platforms to Implement Solution Components

Non Communicable Disease Diagnosis Tools

The specialized diagnosis tools are developed to solve the problem of Non-Communicable Diseases. There are 4 specialized diagnosis tools : **CVD Prediction, Diabetes Prediction** , **Liver Disease Prediction** , **Brain Tumour Diagnosis**
Although all the tools are independent, have different datasets, trained independently and differs in accuracy score, but structurally they share same design given below.

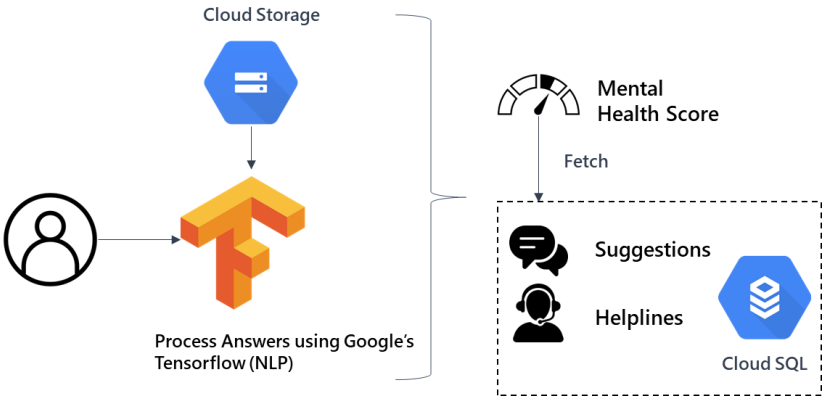
The user input health metrics as instructed in the dashboard. This is sent in the backend for prediction. The application fetch **ML model(Utilized SK-Learn)** from **Google Cloud Storage**, make the prediction & return **risk score & binary classification** of the disease. If the user is authenticated, 3 tasks are followed:

- The results are sent to user via automated mail using **Gmail (SMTP)**
- The results are also sent to **healthcare experts for validation** of results to reduce chances of misdiagnosis.
- The **diagnosis history** is stored in the **Google Cloud SQL Database.**



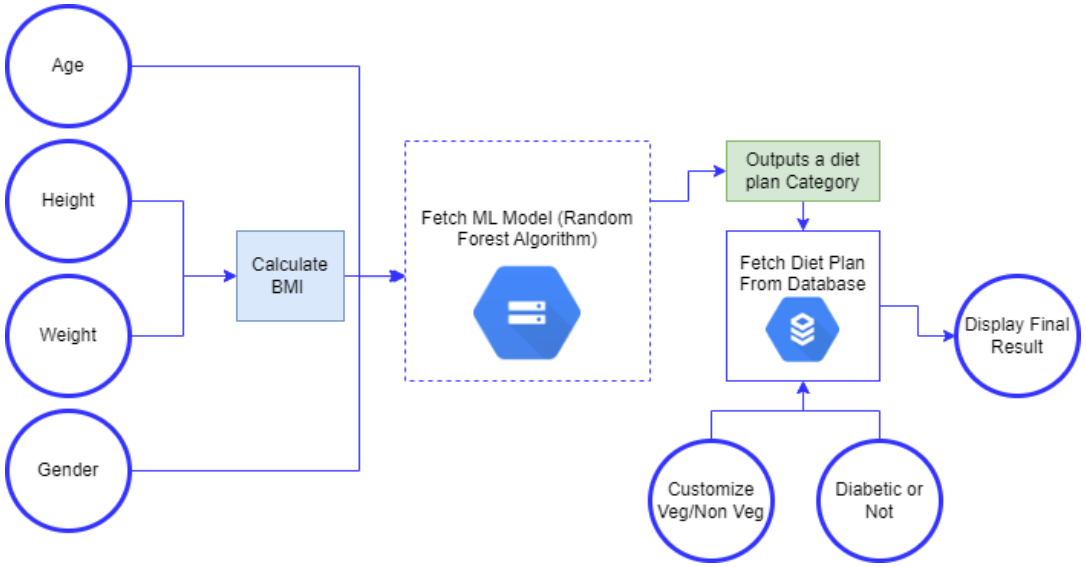
Mental Health Diagnosis

The mental health diagnosis tools is powered by **Tensorflow.** The user have to answer a few questions. It is Processes Using **NLP.** When the results are processed the users are presented with the **Mental Health Score** in the Range of 0 to 100. If the score is low, users are presented with a set of **helplines & suggestions** which are fetched from **Google Cloud SQL Database**.



Diet Planner

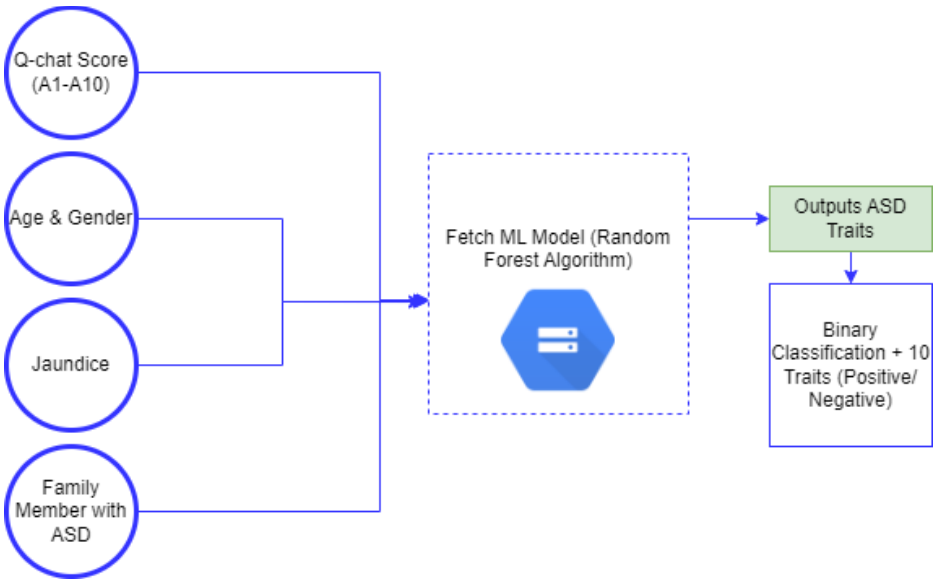
Provide your Age, Height, Weight, Gender. The BMI is calculated & the data is fed into ML Model. The output is a Diet Category fetched from **Google Cloud SQL Database.** Before the user are presented with results, the results are filtered based on users customization i.e. Veg/ Non-Veg or diabetic.



Autism Spectrum Disorder

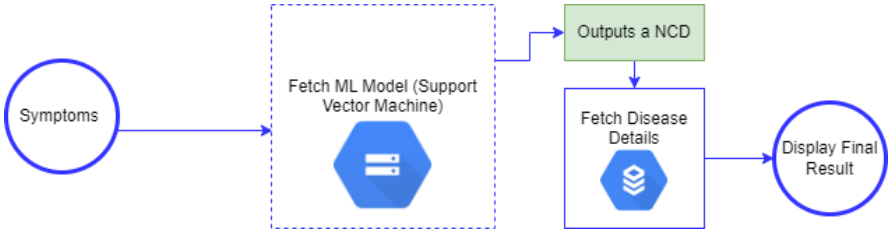
We record ten behavioural features (Q-Chat-10) plus other individuals characteristics that have proved to be effective in detecting the ASD cases from controls in behaviour science, these are processed using random forest algorithm and provide output including ASD Traits.

A1-A10: Items within Q-Chat-10 in which questions possible answers : “Always, Usually, Sometimes, Rarly & Never” items’ values are mapped to “1” or “0” in the dataset. For questions 1-9 (A1-A9) in Q-chat-10, if the respose was Sometimes / Rarly / Never “1” is assigned to the question (A1-A9). However, for question 10 (A10), if the respose was Always / Usually / Sometimes then “1” is assigned to that question. If the user obtained More than 3 Add points together for all ten questions. If your child scores more than 3 (Q-chat-10- score) then there is a potential ASD traits otherwise no ASD traits are observed.



AI Self Diagnosis (Only for NCD’s)

The AI Self Diagnosis tool is trained with **SVM (Support Vector Machine**). The User have to provide a few symptoms, then the model is fetched from **Google Cloud Storage** and users are presented with any **NCD’s** they are suffering. The results are fetched from **Cloud SQL Database** where all the details regarding disease including precautions & medication are present.

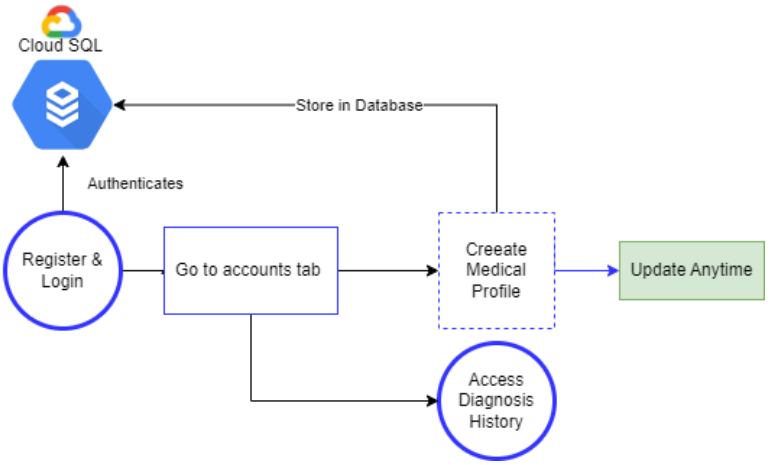


Working of Non AI Tools to Support Additional Functionalities

User Accounts

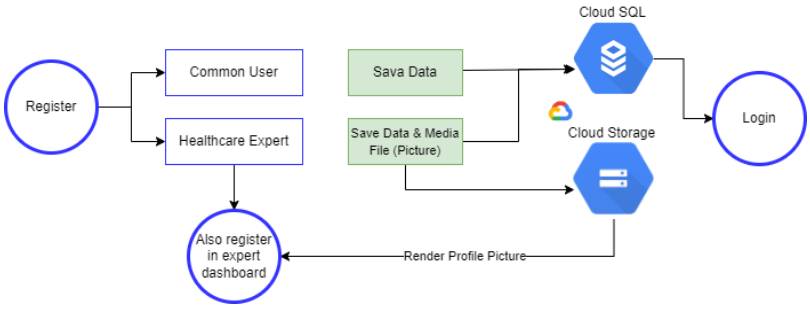
Medical History & Medical Profile

User needs to first register & login to the application to create medical profile and access their diagnosis history. Although user can still diagnose and use AI Tools without authentication, but their history is not stored when logged Out. Since we need user account ID to store history. The diagnosis history and medical profile data are rendered & updated via **Google Cloud SQL Database.**



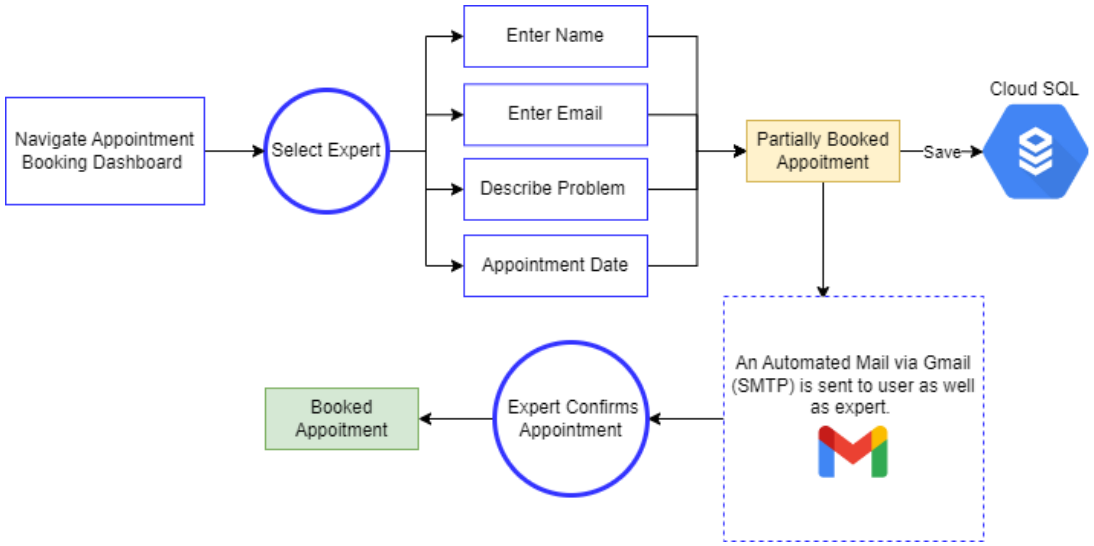
User Registration

You can register as common user as well as a healthcare expert. Both are registered & authenticated via **Cloud SQL Database**. The Expert are also featured in Expert Dashboard so that users can book appointments & contact them. The media files (Expert Profile Picture) are uploaded in **Google Cloud Storage.**



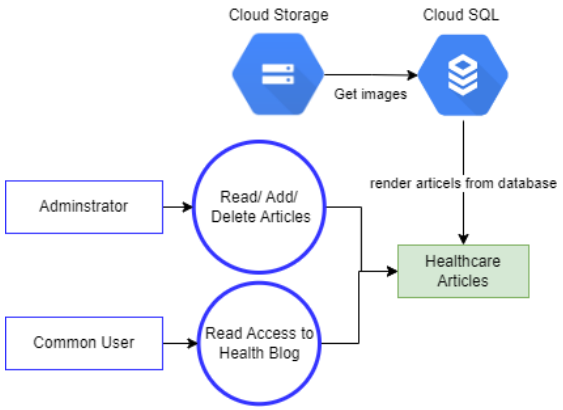
Book Appointment

The below DFD Describe how appointment is booked with expert.



Health Blog

Render articles from Google Cloud SQL Database & Images from Cloud Storage. The administrator can dynamically add/ remove/ update articles from the **Django administration.** The articles are stored in **Google Cloud SQL Database**.



The Application is Equipped with variety of other dynamic functionalities supported by **Google Technologies** including:

- **Quick Search** (Search Any Article & Diagnosis Tools from the navigation bar)
- **Report a bug** (Report a bug button is available in every tool page, if any bugs found you can report it)
- **Password Reset** (Integrated with login page, link is sent via mail to reset the password)
- **User Rating** (you can also rate us in the rating tab present in the navigation)
- **Contact Us** (Contact us via the form available in the end of the homepage)