

CalorieFit

Project Documentation

Course Code : CS23401

Course Name : Database
Management Systems

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1. Problem Statement :-

Today's fitness enthusiasts often enroll themselves in a fitness program with a trainer, to get a humane and expert experience. But the amount of data handled by trainer/consultant's is often large to handle and there is more time and energy spent in curating personalized diet and workout routine for individuals.

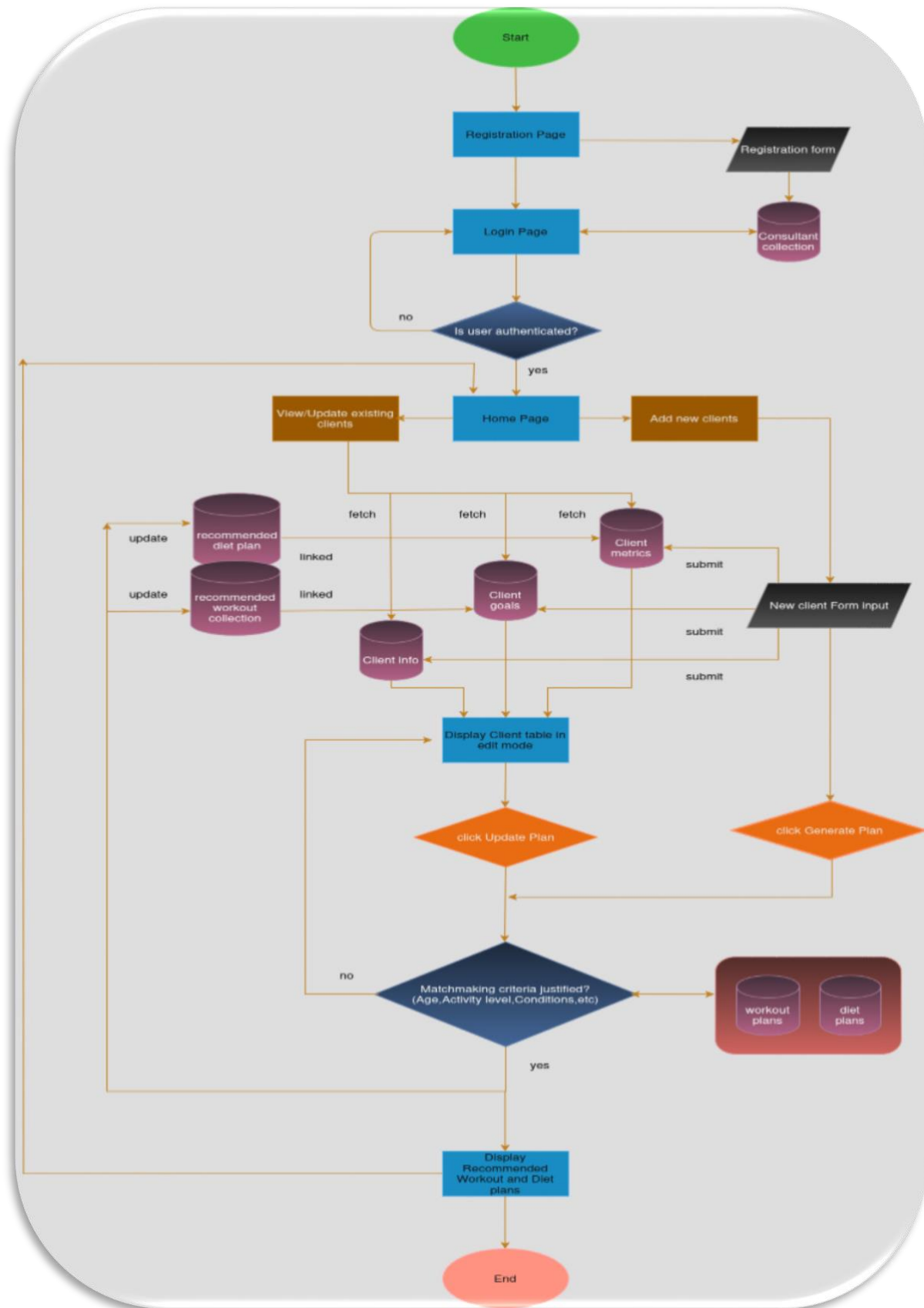
2. Background and Motivation :-

Everyone wants to be fit. But everybody need a personalized diet and workout routine for themselves as everybody are unique in their physical framework. At the same time, they also question the authority and validity of their routines. So they seek for expert solutions putting tension on the trainer and consultants. To streamline their flow of work and research, we are developing this software.

3. Objective Statement :-

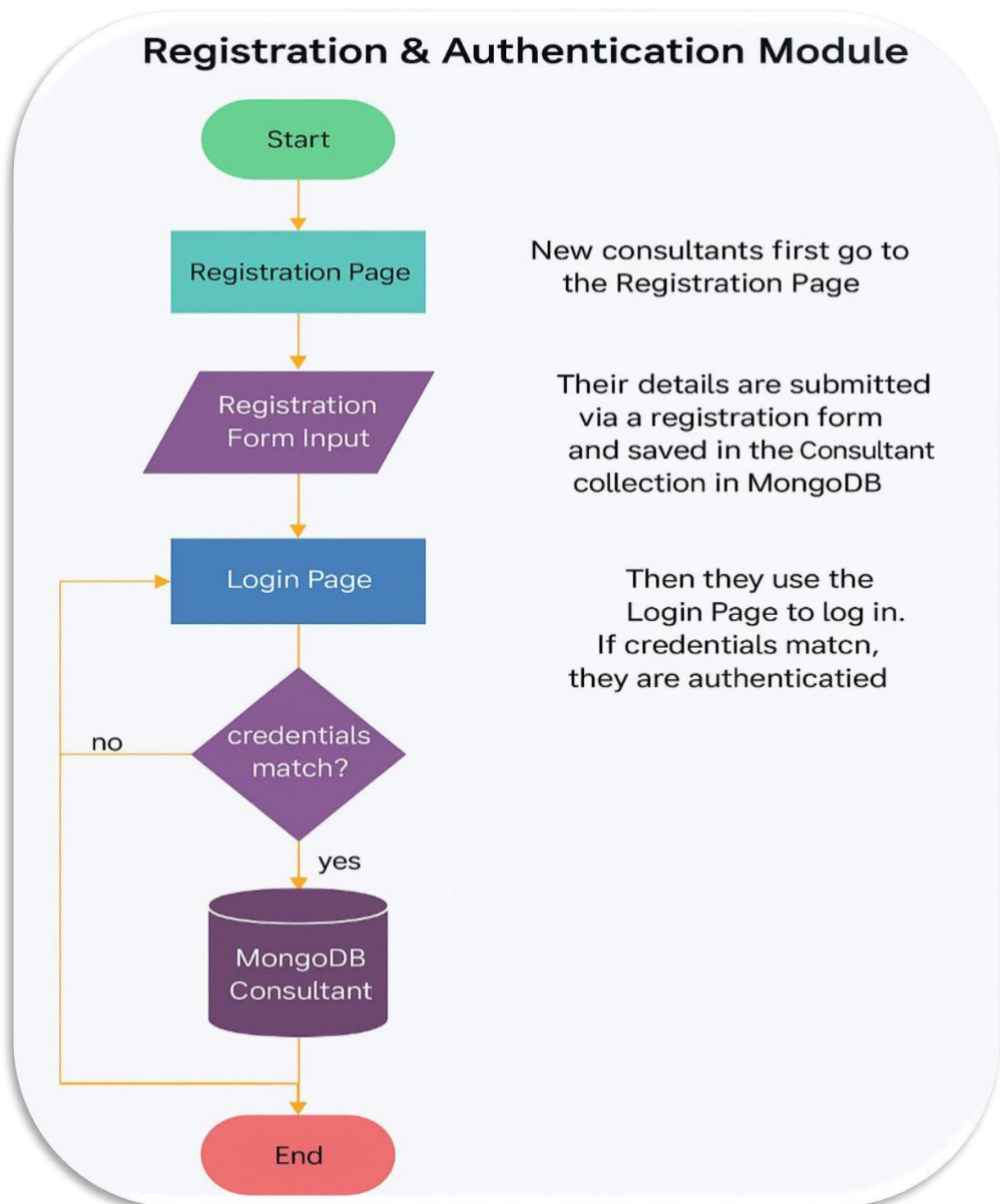
To facilitate research and save time, we are gathering and populating all the current frameworks and practices in the fitness industry in our database which can then be fetched and recommended according to the client needs and their body composition

4. Process Diagram :-



5. Module Flowchart and IO:-

5.1. Registration and Authentication Module



Registration Page

Input :

```
{  
  "name": "John Doe",  
  "email": "john.doe@example.com",  
  "password": "securepassword123"  
}
```

Output :

```
{  
  "message": "Consultant registered successfully",  
  "consultant_id": "643a8fda3f1e7b29f0b3"  
}
```

Login Page

Input :

```
{  
  "email": "john.doe@example.com",  
  "password": "securepassword123"  
}
```

Output (Success) :

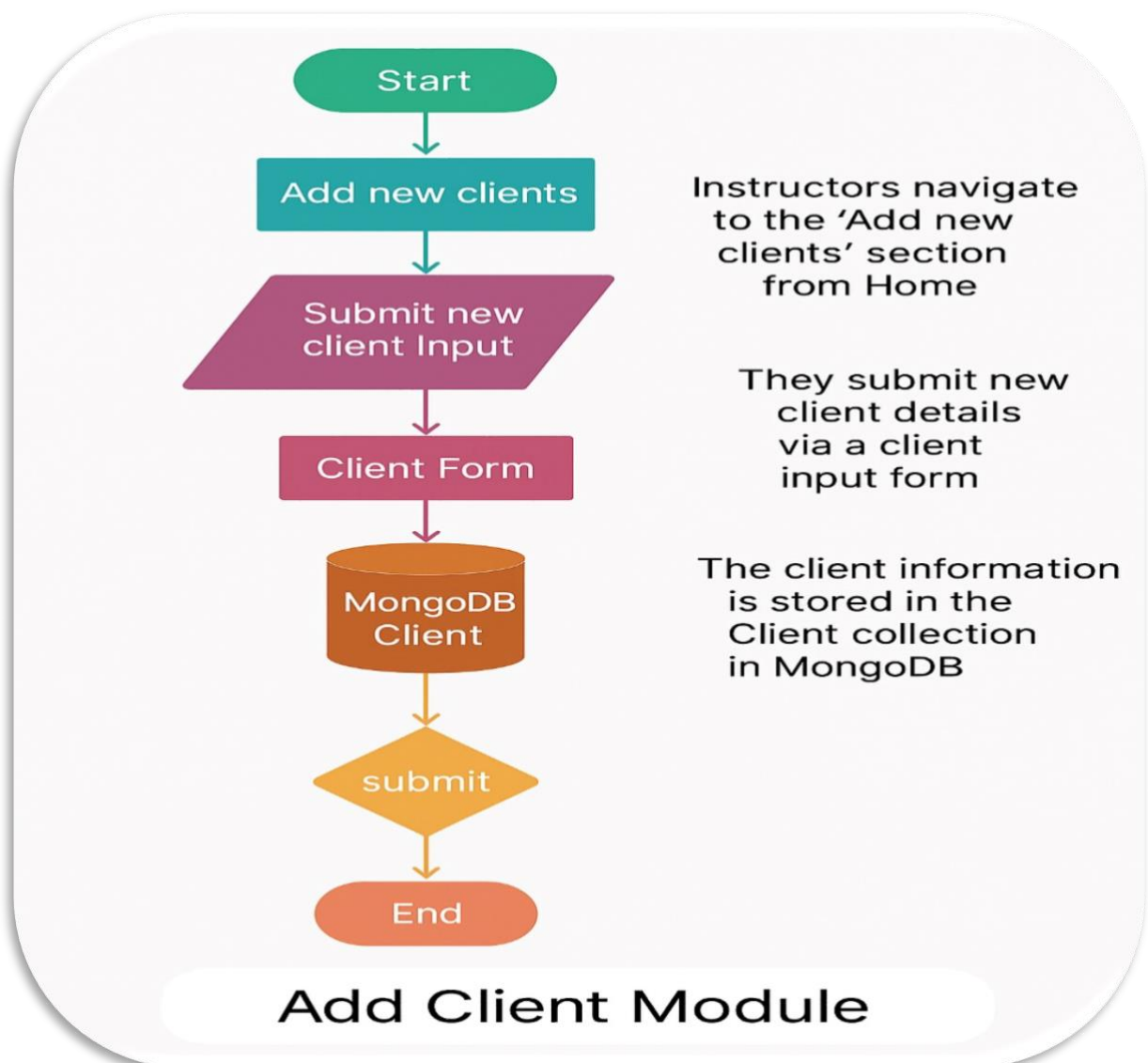
```
{  
  "authenticated": true,
```

```
"token": "JWT_TOKEN_STRING"
}
```

Output (Failure) :

```
{
  "authenticated": false,
  "error": "Invalid credentials"
}
```

5.2. Add Client Module



Add Client

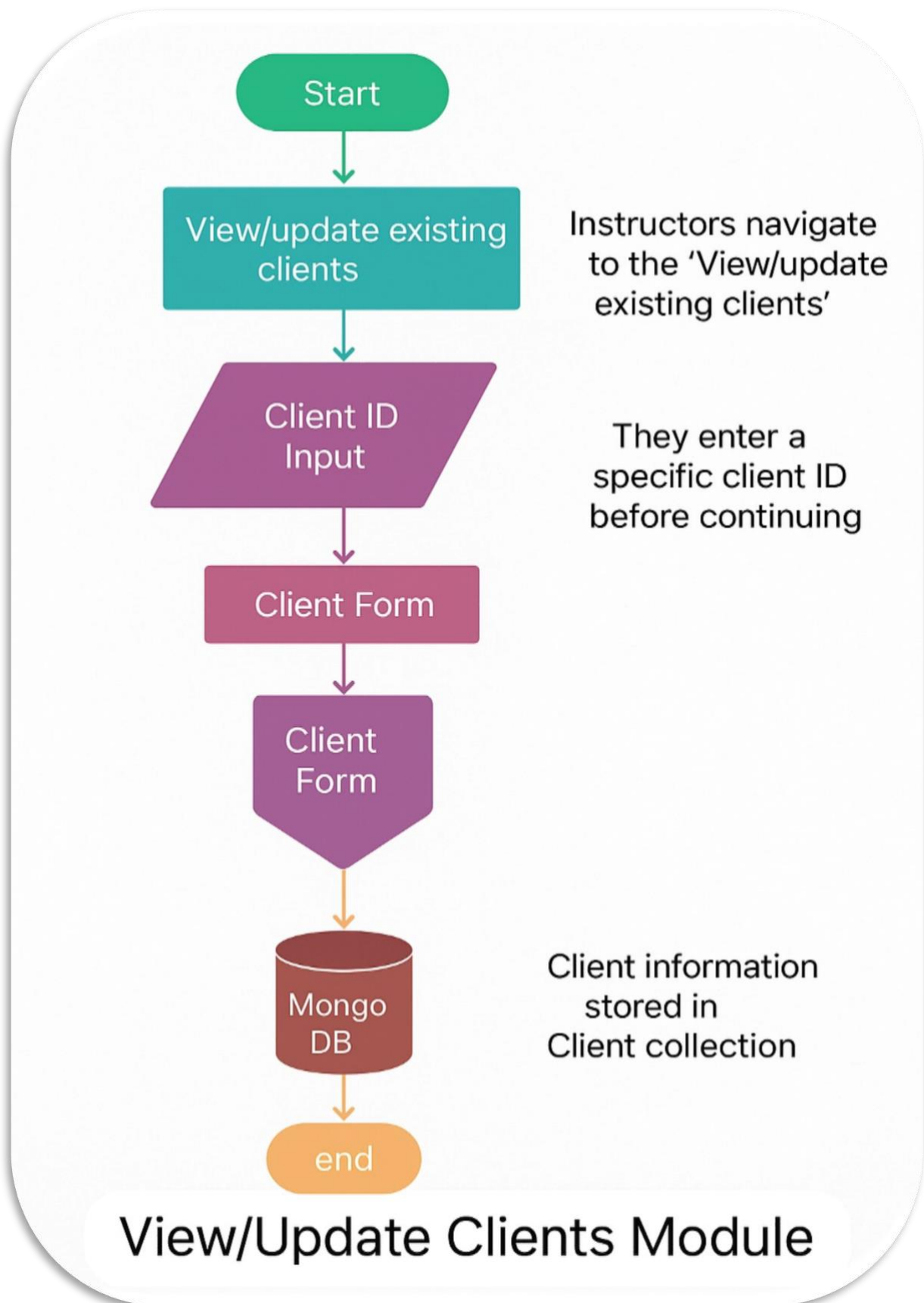
Input :

```
{  
  "client_info": { "name": "Alice", "gender": "Female",  
"age": 30 },  
  "client_goals": ["Weight Loss", "Stamina"],  
  "client_metrics": {  
    "height_cm": 165,  
    "weight_kg": 72,  
    "activity_level": "moderate",  
    "diet_preference": "vegetarian"  
  }  
}
```

Output :

```
{  
  "message": "Client added successfully",  
  "client_id": "652fbea46aa5"  
}
```


5.3. View/Update Clients Module



View/Update Clients

Fetch Output :

```
{
  "clients": [
    {
      "name": "Alice",
      "goals": ["Weight Loss"],
      "metrics": { "weight_kg": 72, "height_cm": 165 }
    }
  ]
}
```

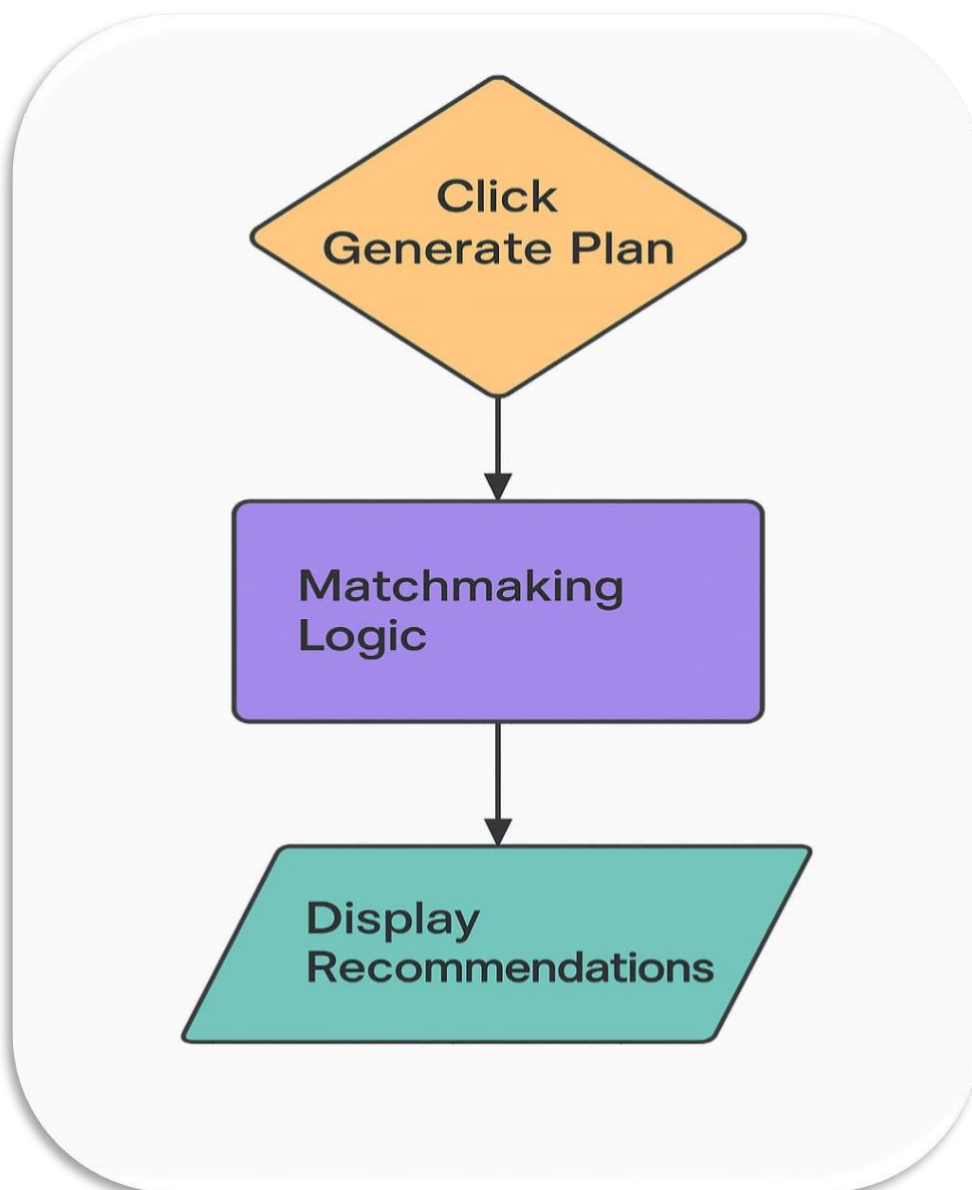
Update Input :

```
{
  "client_id": "652fbea46aa5",
  "updates": { "weight_kg": 70 }
}
```

Output :

```
{ "message": "Client metrics updated" }
```

5.4. Matchmaking and Recommendation Module



Click Generate Plan

Input :

```
{  
  "client_id": "652fbea46aa5"  
}
```

Output :

```
{  
  "status": "success",  
  "message": "Matching initiated"  
}
```

Matchmaking Logic**Input :**

Client metrics including age, activity level, conditions.

Output (Justified) :

```
{  
  "match_found": true,  
  "workout_plan_id": "wk123",  
  "diet_plan_id": "dt123"  
}
```

Display Recommendation**Input :**

Plan IDs

Output :

```
{  
  "workout": "Cardio 3x a week + yoga",  
  "diet": "Low carb, high protein vegetarian diet"  
}
```

6. Features and Schemas :-

6.1. CONSULTANTS:

```
{  
  _id: ObjectId,  
  name: String,  
  email: String,  
  passwordHash: String,  
  createdAt: Date,  
  lastLogin: Date  
}
```

6.2. CLIENT INFO:

```
{  
  _id: ObjectId,  
  consultant_id: ObjectId, // FK to consultants  
  client_id: ObjectId, // Shared ID across client collections  
  name: String,  
  email: String,  
  phone: String,  
  occupation: String,  
  lifestyle: String, // e.g., sedentary, active  
  gender: String, // "male", "female", etc.  
}
```

```
notes: String,  
createdAt: Date  
}
```

6.3. CLIENT-GOALS:

```
{  
  _id: ObjectId,  
  client_id: ObjectId, // FK  
  primary_goal: String, // e.g., "weight_loss"  
  secondary_goal: String, // e.g., "muscle_gain"  
  tertiary_goal: String, // e.g., "performance"  
  updatedAt: Date  
}
```

6.4. CLIENT-METRICS:

```
{  
  _id: ObjectId,  
  client_id: ObjectId, // FK  
  age: Number,  
  gender: String,  
  height_cm: Number,  
  weight_kg: Number,  
  bmi: Number, // optional (can be derived)  
  body_fat_percentage: Number,
```

```
blood_sugar: Number,  
blood_pressure: String,  
cholesterol: Number,  
resting_heart_rate: Number,  
sleep_hours: Number,  
activity_level: String, // e.g., low, moderate, high  
diet_preference: String, // e.g., vegan, keto  
medical_conditions: [String], // e.g., ["diabetes",  
"hypertension"]  
last_updated: Date  
}
```

6.5. PRE-CONFIGURED WORKOUT AND DIET PLANS :

Set 1: Weight Loss – Beginner, High BMI, Low Activity:

Workout Plan:

```
{  
  "goal": "weight_loss",  
  "condition": "sedentary_high_bodyfat_prediabetic",  
  "metrics_range": {
```

```
"age": [25, 40],
"gender": "any",
"body_fat_percentage": [30, 40],
"blood_sugar": [100, 125],
"activity_level": "low",
"medical_conditions": ["prediabetes"]
},
"plan": {
"type": "cardio_intensive",
"days_per_week": 5,
"duration_per_session_min": 45,
"activities": ["brisk walking", "cycling", "aerobic dance"],
"progression": "increase intensity weekly",
"notes": "focus on fat burning zone (60-70% max HR)"
}
}
```

Diet Plan:

```
{
"goal": "weight_loss",
"condition": "sedentary_high_bodyfat_prediabetic",
"diet_preference": "balanced",
"macros": {
```



```
"carbs_percent": 40,  
"protein_percent": 30,  
"fat_percent": 30  
,  
"guidelines": {  
  "sugar_intake": "low",  
  "fiber_rich": true,  
  "meals_per_day": 5,  
  "snacks": "low-GI fruit or nuts"  
}  
}
```

Set 2: Lean Muscle Gain – Moderately Active, Low Body Fat:

Workout Plan:

```
{  
  "goal": "muscle_gain",  
  "condition": "moderate_active_low_bodyfat",  
  "metrics_range": {  
    "age": [18, 35],  
    "gender": "any",  
    "body_fat_percentage": [10, 18],
```

```
"activity_level": "moderate"
},
"plan": {
  "type": "hypertrophy_strength_split",
  "days_per_week": 4,
  "duration_per_session_min": 60,
  "activities": ["compound lifts", "resistance training",
"calisthenics"],
  "progression": "add weight every 2 weeks"
}
}
```

Diet Plan:

```
{
  "goal": "muscle_gain",
  "condition": "moderate_active_low_bodyfat",
  "diet_preference": "high_protein",
  "macros": {
    "carbs_percent": 50,
    "protein_percent": 35,
    "fat_percent": 15
  },
  "guidelines": {
```

```
"calorie_surplus": 300,  
"protein_sources": ["chicken", "lentils", "eggs", "protein  
shakes"],  
"meals_per_day": 6  
}  
}
```

Set 3: Endurance – High Activity, Healthy Metrics:

Workout Plan:

```
{  
  "goal": "endurance_training",  
  "condition": "high_active_healthy",  
  "metrics_range": {  
    "age": [20, 45],  
    "gender": "any",  
    "resting_heart_rate": [50, 65],  
    "activity_level": "high"  
  },  
  "plan": {  
    "type": "aerobic_and_threshold",  
    "days_per_week": 6,  

```

```
"duration_per_session_min": 60,  
"activities": ["running", "cycling", "swimming"],  
"progression": "increase time/distance"  
}  
}
```

Diet Plan:

```
{  
  "goal": "endurance_training",  
  "condition": "high_active_healthy",  
  "diet_preference": "high_carb",  
  "macros": {  
    "carbs_percent": 60,  
    "protein_percent": 20,  
    "fat_percent": 20  
  },  
  "guidelines": {  
    "hydration_focus": true,  
    "electrolytes": true,  
    "carb_timing": "before and after workout"  
  }  
}
```

Set 4: Hypertension Management – Overweight, Low Activity:

Workout Plan:

```
{  
  "goal": "blood_pressure_control",  
  "condition": "low_active_hypertensive",  
  "metrics_range": {  
    "age": [35, 60],  
    "gender": "any",  
    "blood_pressure": "140/90 to 160/100",  
    "activity_level": "low",  
    "medical_conditions": ["hypertension"]  
  },  
  "plan": {  
    "type": "light_aerobic_with_mobility",  
    "days_per_week": 5,  
    "duration_per_session_min": 30,  
    "activities": ["walking", "yoga", "light cycling"],  
    "progression": "slow and monitored"  
  }  
}
```

Diet Plan:

```
{  
  "goal": "blood_pressure_control",  
  "condition": "low_active_hypertensive",  
  "diet_preference": "DASH",  
  "macros": {  
    "carbs_percent": 45,  
    "protein_percent": 25,  
    "fat_percent": 30  
  },  
  "guidelines": {  
    "sodium_limit": "1500mg",  
    "potassium_rich": true,  
    "processed_foods": "minimized"  
  }  
}
```

Set 5: Recovery & Rebuilding – Post-Illness, Low Activity, Medical Conditions Present:

Workout Plan:

```
{
```

```
"goal": "recovery_fitness",
"condition": "post_illness_low_active",
"metrics_range": {
  "age": [30, 60],
  "gender": "any",
  "activity_level": "low",
  "medical_conditions": ["post-surgery", "autoimmune",
"COVID recovery"]
},
"plan": {
  "type": "rehab_and_mobility",
  "days_per_week": 3,
  "duration_per_session_min": 20,
  "activities": ["guided stretching", "balance drills",
"resistance bands"],
  "progression": "increase range and reps slowly"
}
}
```

Diet Plan:

```
{
  "goal": "recovery_fitness",
  "condition": "post_illness_low_active",
```

```
"diet_preference": "anti_inflammatory",
"macros": {
  "carbs_percent": 40,
  "protein_percent": 35,
  "fat_percent": 25
},
"guidelines": {
  "antioxidants_focus": true,
  "hydration": "high",
  "meals_per_day": 4,
  "avoid": ["refined sugar", "processed oils"]
}
}
```

Set 6: Diabetic Control – Mid Age, Moderate Activity, Blood Sugar Control:

Workout Plan:

```
{
  "goal": "blood_sugar_control",
  "condition": "moderate_active_diabetic",
  "metrics_range": {
    "age": [30, 55],
```



```
"gender": "any",
"blood_sugar": [126, 180],
"activity_level": "moderate",
"medical_conditions": ["diabetes"]
},
"plan": {
"type": "consistent_cardio_mixed",
"days_per_week": 5,
"duration_per_session_min": 40,
"activities": ["treadmill walk", "water aerobics", "circuit
training"],
"progression": "maintain consistent heart rate zone"
}
}
```

Diet Plan:

```
{
"goal": "blood_sugar_control",
"condition": "moderate_active_diabetic",
"diet_preference": "low_glycemic",
"macros": {
"carbs_percent": 35,
"protein_percent": 30,
```

```
"fat_percent": 35
},
"guidelines": {
  "low_gi_foods": true,
  "fiber_rich": true,
  "meal_timing": "regular",
  "avoid": ["sugary snacks", "white bread"]
}
}
```

Set 7: Healthy Aging – Active Older Adults with Normal Vitals:

Workout Plan:

```
{
  "goal": "healthy_aging",
  "condition": "older_active_healthy",
  "metrics_range": {
    "age": [55, 70],
    "gender": "any",
    "activity_level": "moderate",
    "medical_conditions": []
  },
}
```

```
"plan": {  
  "type": "mobility_strength_balance",  
  "days_per_week": 4,  
  "duration_per_session_min": 35,  
  "activities": ["tai chi", "resistance bands", "aqua  
aerobics", "walking"],  
  "progression": "focus on joint health and fall prevention"  
}
```

Diet Plan:

```
{  
  "goal": "healthy_aging",  
  "condition": "older_active_healthy",  
  "diet_preference": "mediterranean",  
  "macros": {  
    "carbs_percent": 40,  
    "protein_percent": 30,  
    "fat_percent": 30  
  },  
  "guidelines": {  
    "bone_health_support": true,  
    "omega3_sources": ["fish", "chia seeds"],
```

```
"meals_per_day": 3,  
"snacks": "fruits, seeds"  
}  
}
```

Set 8: Stress & Sleep Recovery – High BP, Poor Sleep, Mid Age:

Workout Plan:

```
{  
  "goal": "stress_sleep_balance",  
  "condition": "high_bp_low_sleep",  
  "metrics_range": {  
    "age": [35, 50],  
    "gender": "any",  
    "blood_pressure": "130/85 to 150/95",  
    "sleep_hours": [4, 6],  
    "medical_conditions": ["hypertension", "insomnia"]  
  },  
  "plan": {  
    "type": "restorative_yoga_cardio_mix",  
    "days_per_week": 4,  
    "duration_per_session_min": 30,  

```

"activities": ["restorative yoga", "deep breathing", "light elliptical"],

"progression": "shift into active recovery routines"

}

}

Diet Plan:

{

"goal": "stress_sleep_balance",

"condition": "high_bp_low_sleep",

"diet_preference": "sleep_supportive",

"macros": {

"carbs_percent": 45,

"protein_percent": 25,

"fat_percent": 30

},

"guidelines": {

"magnesium_rich": ["leafy greens", "pumpkin seeds"],

"avoid_stimulants": true,

"meal_timing": "no meals after 8pm",

"hydration": "moderate"

}

}

7. Softwares Used :-

MERN Stack

MongoDB: NoSQL database for flexible and scalable data storage. To store user data like profiles, activity logs, and dietary information.

Express.js: Server-side framework simplifying API and route management. To handle API requests, such as retrieving and updating fitness data.

React: Front-end library for dynamic, interactive user interfaces. To create an interactive, user-friendly interface for tracking fitness goals and progress.

Node.js: Runtime environment enabling JavaScript on the server side. To ensure smooth communication between the database and front end.

8. Future Technologies :-

1. Personalized Plan Generation Using AI

Integrate machine learning models to automatically generate personalized workout and diet plans based on client biometrics and progress history.

2. Progress Tracking Dashboard

Develop a visual dashboard for clients and trainers to monitor progress over time, including graphs for weight, BMI, and adherence to plans.

3. Mobile App Integration

Extend the system to a mobile platform for easier client-trainer interaction, real-time updates, and push notifications for daily routines.

4. In-App Communication and Feedback

Enable direct communication between trainers and clients, including feedback forms and plan adjustment requests within the platform.