

Problem 1: Fitness Tracking App

Problem 1 Statement:

Decompose the development of a fitness tracking app that can track users' workouts, monitor their diet, and provide health insights.

Instructions:

1. Define the main goal of the application.
2. Use the top-down approach to break down the app into its major features.
3. Further decompose each feature into smaller, manageable tasks.
4. Identify opportunities for modularization.

Main Goal of the Application

To build a fitness tracking app that helps users:

- Log and monitor their **workouts**
- Track their **diet and nutrition**
- Receive **personalized health insights**

Top-Down Approach – Step 1: Identify Major Features

Break the app into its main functional areas:

1. **Workout Tracking**
2. **Diet Monitoring**
3. **Health Insights**
4. **User Management**

Top-Down Approach – Step 2: Decompose Each Feature

1. Workout Tracking

- Add a new workout (type, duration, calories)
- View workout history
- Plan future workouts (calendar, goals)

- Display workout progress (charts, summaries)

2. Diet Monitoring

- Log daily meals and snacks
- Search food database (name, brand, macros)
- Track calories and macronutrients (carbs, proteins, fats)
- Monitor water intake

3. Health Insights

- Generate weekly/monthly reports
- Suggest personalized recommendations (e.g., increase protein intake, reduce sugar)
- Set and track health goals (weight loss, muscle gain, maintenance)
- Integrate with fitness wearables (e.g., Fitbit, Apple Watch)

4. User Management

- User registration and login
- Store personal data (age, height, weight, activity level)
- Set personal preferences and goals
- Manage app settings and notifications

Opportunities for Modularization

Each core feature can be implemented as a **separate module**, enabling independent development and testing:

Module	Responsibility
WorkoutModule	Add, view, plan, and analyze workouts
NutritionModule	Log meals, calculate calories/macros, manage food database
HealthInsightsModule	Generate reports, offer health recommendations

Module	Responsibility
UserModule	Handle login, profile, preferences
DataStorageModule	Store and retrieve workout/diet/user data
AnalyticsModule	Produce graphs, summaries, and track progress
IntegrationModule	Optional: Sync with external APIs and wearables

Step-by-Step Summary

1. **Define the broad goal** – support users in managing fitness and nutrition.
2. **Use top-down design** – break the app into main functional areas.
3. **Decompose each function** – list all sub-tasks and features under each area.
4. **Modularize** – implement each part as an independent module to ensure clean, maintainable, and scalable code.

Problem 2: Create Online Learning Platform

Problem 2 Statement:

Decompose the creation of an online learning platform that supports course creation, user enrollment, content delivery, and progress tracking.

Instructions:

1. Define the main goal of the platform.
2. Use the top-down approach to break down the platform into its major features.
3. Further decompose each feature into smaller, manageable tasks.
4. Identify opportunities for modularization.

Main Goal of the Platform

To build an online learning platform that allows:

- Instructors to **create and manage courses**

- Students to **enroll in courses and access content**
- The system to **deliver content, track progress, and support learning**

Top-Down Approach – Step 1: Identify Major Features

Divide the platform into key functional components:

1. **Course Management**
2. **User Enrollment & Authentication**
3. **Content Delivery**
4. **Progress Tracking**
5. **Communication & Interaction (optional)**
6. **Admin Panel (optional)**

Top-Down Approach – Step 2: Decompose Each Feature

1. Course Management (For Instructors)

- Create/edit/delete courses
- Add modules, lessons, and quizzes
- Upload files (PDFs, videos, slides)
- Set course requirements and schedules

2. User Enrollment & Authentication

- User registration (students & instructors)
- Login/logout and role-based access
- Enroll or unenroll from courses
- View enrolled courses dashboard

3. Content Delivery

- Stream video lessons
- Display text materials and resources

- Provide download links for files
- Structure content by modules or sections

4. Progress Tracking

- Track completed lessons/modules
- Display course progress bar
- Show quiz results or scores
- Provide certificates (optional)

5. Communication & Interaction (Optional)

- Discussion forums per course
- Live Q&A or chat functionality
- Instructor feedback on assignments

6. Admin Panel (Optional)

- Manage users and permissions
- Monitor course statistics and activity
- Moderate content and discussions

Opportunities for Modularization

Each major feature can be built as a **standalone module**, allowing developers to work independently and reuse components:

Module	Responsibility
CourseModule	Handles course creation, structure, content upload
UserModule	Registration, authentication, and user roles
EnrollmentModule	Course enrollment management
ContentDeliveryModule	Streaming, displaying, and organizing course materials
ProgressModule	Tracks student progress and quiz performance

Module	Responsibility
CommunicationModule	Forums, messaging, and feedback systems (optional)
AdminModule	Platform-wide settings, user/course moderation (optional)
StorageModule	Handles file uploads and downloads

Step-by-Step Summary

1. **Define the main goal** – support online teaching and learning with course management, content access, and tracking.
2. **Top-down design** – split the platform into broad feature areas.
3. **Decompose features** – list out detailed tasks for each area (e.g., lessons under courses, registration under user management).
4. **Modularize** – turn each logical area into a module for cleaner architecture, scalability, and parallel development.