# MongoDB Data Modelling: E-commerce

## What Is Data Modelling?

In MongoDB, **data modeling** is the process of designing the **structure of your documents and collections** to match your app's requirements and performance needs.

## Project Context: Fitness App

### 1. Identify Collections

|  |  |
| --- | --- |
| Collection | Purpose |
| users | Registered users of the app |
| profiles | Extended fitness-related user info |
| challenges | Fitness challenges created by users |
| posts | Social updates related to challenges (media + content) |
| leaderboards | Rankings per challenge |
| teams | Group of users participating together in a challenge |
| progress\_logs | User activity progress updates (daily logs) |
| rewards | Gamified badges, titles, or points-based items |
| notifications | In-app or push notifications |
| activity\_trackers | External fitness tracker integration & sync data |

### 2. Define Relationships

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| # | Relationship | Type | Description | Field Reference | Modeling Approach | Justification |
| 1 | User ↔ Profile | 1–1 | Each user has a detailed profile | profiles.userId → users.\_id | 🔗 Reference | Keep profile info separate, modular |
| 2 | User ↔ Challenges (Created) | 1–M | A user can create many challenges | challenges.creatorId → users.\_id | 🔗 Reference | Avoid duplicate user data |
| 3 | User ↔ Challenges (Joined) | M–M | Users can join many challenges | profiles.joinedChallenges[] → challenges.\_id | 🔗 Reference | Efficient to track from user side |
| 4 | User ↔ Posts | 1–M | A user can make many posts | posts.userId → users.\_id | 🔗 Reference | Posts need user info and challenge context |
| 5 | Challenge ↔ Posts | 1–M | Each challenge has many related posts | posts.challengeId → challenges.\_id | 🔗 Reference | Useful for fetching challenge feed |
| 6 | Challenge ↔ Leaderboard | 1–1 | Each challenge has one leaderboard | leaderboards.challengeId → challenges.\_id | 🔗 Reference | Dedicated structure for rankings |
| 7 | Challenge ↔ Teams | 1–M | Each challenge can have multiple teams | teams.challengeId → challenges.\_id | 🔗 Reference | Clean modeling for group challenges |
| 8 | Team ↔ Users | M–M | A team contains many users | teams.members[] → users.\_id | 🔗 Reference | Needed to build real-time team dashboards |
| 9 | User ↔ Progress Logs | 1–M | Logs track daily steps, workouts, etc. | progress\_logs.userId → users.\_id | 🔗 Reference | Time-series fitness data is separate |
| 10 | User ↔ Rewards | M–M | Users earn multiple rewards | rewards.earnedBy[] → users.\_id | 🔗 Reference | Rewards trackable across users |

### 3. Embed vs Reference

|  |  |
| --- | --- |
| **Use Case** | **Recommended Modeling** |
| Fitness profile details of a user | Reference userId |
| User's joined challenges | Reference joinedChallenges[] |
| Challenge participants | Reference participants[] |
| Challenge goal and rules | Embed |
| Creator of a challenge | Reference creatorId |
| Comments and likes on a post | Reference userId |
| Posts in a challenge | Reference challengeId |
| Daily fitness progress logs | Reference userId |

### 4. Sample Schemas

#### a. users

{

"\_id": ObjectId("64a1b2c3d4e5f6789abcdef0"),

"username": "fitnessjohn",

"email": "john.doe@gmail.com",

"passwordHash": "$2b$10$N9qo8uLOickgx2ZMRZoMyeIjZAgcfl7p92ldGxad68LJZdL17lhWy",

"profilePicURL": "https://example.com/profiles/john.jpg",

"joinedAt": ISODate("2025-06-15T08:30:00Z"),

"isVerified": true,

"role": "user"

}

#### b. profile

{

"\_id": ObjectId("64a1b2c3d4e5f6789abcdef2"),

"userId": ObjectId("64a1b2c3d4e5f6789abcdef0"),

"gender": "male",

"dob": ISODate("1992-03-15"),

"location": "Chennai, Tamil Nadu",

"fitnessLevel": "intermediate",

"totalPoints": 2450,

"bio": "Passionate runner and fitness enthusiast. Love outdoor challenges!",

"trackerIntegration": {

"provider": "Fitbit",

"accountId": "FB123456789"

},

"joinedChallenges": [

ObjectId("64a1b2c3d4e5f6789abcdef8"),

ObjectId("64a1b2c3d4e5f6789abcdef9")

],

"createdAt": ISODate("2025-06-15T08:35:00Z"),

"updatedAt": ISODate("2025-07-20T14:22:00Z")

}

#### c. challenges

{

"\_id": ObjectId("64a1b2c3d4e5f6789abcdef8"),

"creatorId": ObjectId("64a1b2c3d4e5f6789abcdef1"),

"title": "30-Day Summer Step Challenge",

"description": "Walk 10,000 steps daily for 30 days. Let's build healthy habits together!",

"category": "walking",

"goalType": "steps",

"goalValue": 10000,

"startDate": ISODate("2025-07-01T00:00:00Z"),

"endDate": ISODate("2025-07-30T23:59:59Z"),

"visibility": "public",

"participants": [

ObjectId("64a1b2c3d4e5f6789abcdef0"),

ObjectId("64a1b2c3d4e5f6789abcdef1"),

ObjectId("64a1b2c3d4e5f6789abcdef4")

],

"createdAt": ISODate("2025-06-25T12:00:00Z"),

"updatedAt": ISODate("2025-07-20T16:30:00Z")}

#### d. post

{

"\_id": ObjectId("64a1b2c3d4e5f6789abcdefB"),

"userId": ObjectId("64a1b2c3d4e5f6789abcdef0"),

"challengeId": ObjectId("64a1b2c3d4e5f6789abcdef8"),

"content": "Just completed my morning 5K run! Day 15 of the step challenge and feeling stronger every day. Who else is crushing their goals?",

"mediaURL": "https://example.com/posts/run\_photo\_john.jpg",

"likes": [

ObjectId("64a1b2c3d4e5f6789abcdef1"),

ObjectId("64a1b2c3d4e5f6789abcdef4")

],

"comments": [

{

"userId": ObjectId("64a1b2c3d4e5f6789abcdef1"),

"comment": "Amazing progress! Keep it up! ",

"createdAt": ISODate("2025-07-15T15:30:00Z")

},

{

"userId": ObjectId("64a1b2c3d4e5f6789abcdef4"),

"comment": "Inspiring! I need to step up my game ",

"createdAt": ISODate("2025-07-15T16:45:00Z")

}

],

"createdAt": ISODate("2025-07-15T14:22:00Z")

}

#### e. leaderboard

{

"\_id": ObjectId("64a1b2c3d4e5f6789abcdefD"),

"challengeId": ObjectId("64a1b2c3d4e5f6789abcdef8"),

"rankings": [

{

"userId": ObjectId("64a1b2c3d4e5f6789abcdef1"),

"score": 285000,

"rank": 1

},

{

"userId": ObjectId("64a1b2c3d4e5f6789abcdef0"),

"score": 267800,

"rank": 2

},

{

"userId": ObjectId("64a1b2c3d4e5f6789abcdef4"),

"score": 234500,

"rank": 3

}

],

"updatedAt": ISODate("2025-07-22T23:59:00Z")

}

#### f. teams

{

"\_id": ObjectId("64a1b2c3d4e5f6789abcdefE"),

"challengeId": ObjectId("64a1b2c3d4e5f6789abcdef8"),

"name": "Chennai Steppers",

"members": [

ObjectId("64a1b2c3d4e5f6789abcdef0"),

ObjectId("64a1b2c3d4e5f6789abcdef4"),

ObjectId("64a1b2c3d4e5f6789abcdef6")

],

"totalSteps": 756300,

"totalCalories": 18907,

"createdAt": ISODate("2025-07-02T10:00:00Z"),

"updatedAt": ISODate("2025-07-22T20:15:00Z")

}

#### g. progress\_logs

{

"\_id": ObjectId("64a1b2c3d4e5f6789abcdefF"),

"userId": ObjectId("64a1b2c3d4e5f6789abcdef0"),

"challengeId": ObjectId("64a1b2c3d4e5f6789abcdef8"),

"date": ISODate("2025-07-22T00:00:00Z"),

"steps": 12847,

"caloriesBurned": 485,

"distance": 9.2,

"workoutsCompleted": 1,

"createdAt": ISODate("2025-07-22T23:45:00Z")

}

#### h. rewards

{

"\_id": ObjectId("64a1b2c3d4e5f6789abcdef11"),

"title": "Step Master Badge",

"type": "badge",

"pointsRequired": 1000,

"imageURL": "https://example.com/badges/step\_master.png",

"earnedBy": [

ObjectId("64a1b2c3d4e5f6789abcdef0"),

ObjectId("64a1b2c3d4e5f6789abcdef1")

],

"createdAt": ISODate("2025-06-01T12:00:00Z"),

"updatedAt": ISODate("2025-07-20T14:30:00Z")

}

#### i. notifications

{

"\_id": ObjectId("64a1b2c3d4e5f6789abcdef13"),

"userId": ObjectId("64a1b2c3d4e5f6789abcdef0"),

"message": "Congratulations! You've reached 10,000 steps today! 🎉",

"type": "milestone",

"isRead": false,

"createdAt": ISODate("2025-07-22T18:30:00Z")

}

#### j. activity\_trackers

{

"\_id": ObjectId("64a1b2c3d4e5f6789abcdef16"),

"userId": ObjectId("64a1b2c3d4e5f6789abcdef0"),

"provider": "Fitbit",

"lastSynced": ISODate("2025-07-22T23:30:00Z"),

"syncData": {

"totalSteps": 12847,

"totalCalories": 485,

"sleepHours": 7.5

},

"createdAt": ISODate("2025-06-15T08:40:00Z"),

"updatedAt": ISODate("2025-07-22T23:30:00Z")

}