



Software Design And Testing

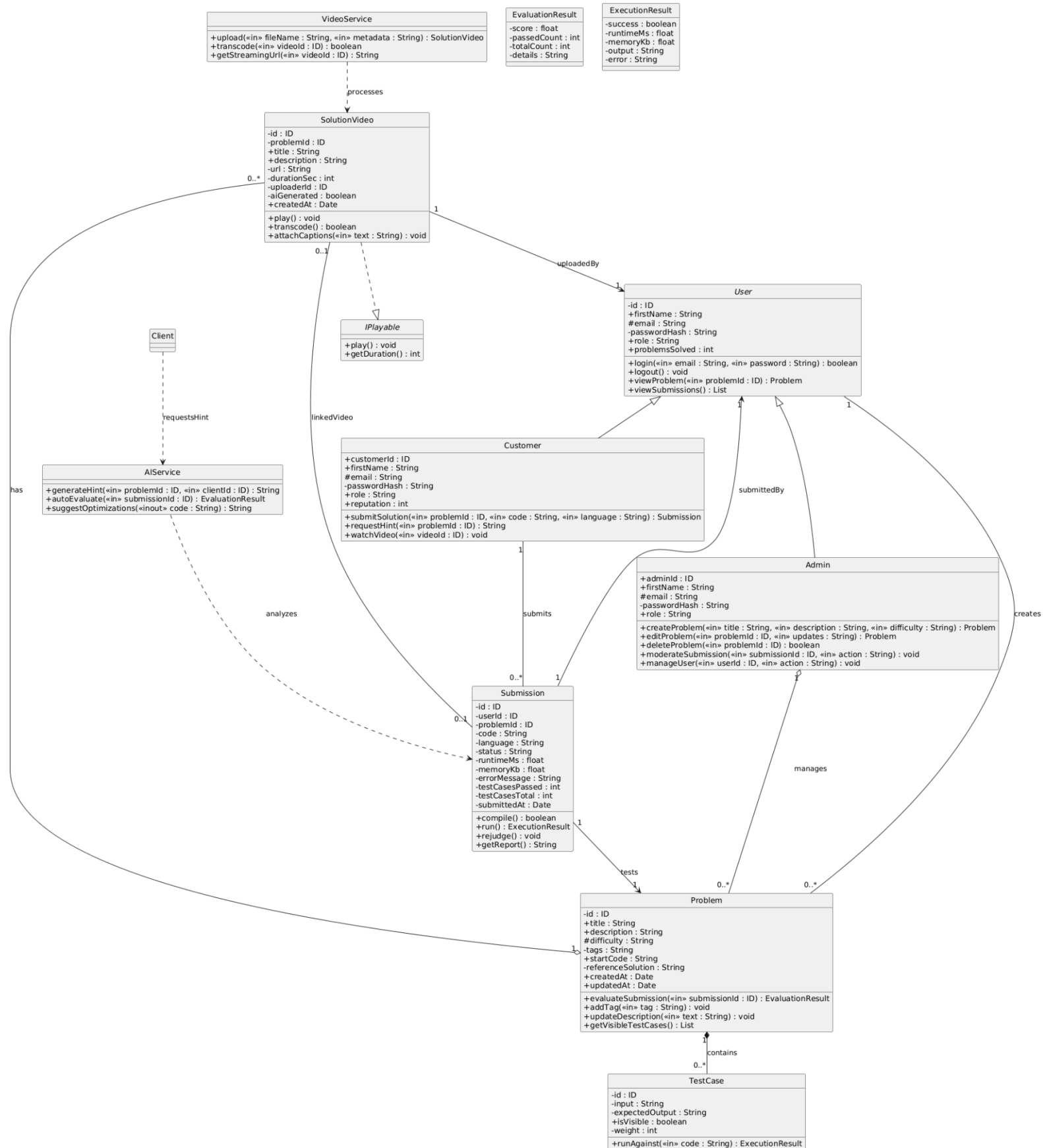
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Class Diagram

Entities

The class diagram represents a system with the following entities:

- **SolutionVideo**: Represents a video solution with associated metadata.
- **User**: Represents a user of the system with personal and problem-solving details.
- **Customer**: Represents a customer entity linked to submissions.
- **Admin**: Represents an administrative user with management capabilities.
- **Submission**: Represents a user's submission with evaluation details.
- **Problem**: Represents a problem with associated test cases.
- **TestCase**: Represents individual test cases for a problem.
- **Client**: Represents a client entity interacting with the system.

Attributes

- **SolutionVideo**: ID, videoID, title, String views, SolutionVideo status (e.g., score float, detailCount int, success boolean, memoryBytes float, error String).
- **User**: ID, firstName, lastName, passwordHash, problemsSolved int, logout() void, viewSubmission(ID) void.
- **Customer**: customerID, email, name, phoneNumber.
- **Admin**: firstName, lastName, passwordHash, createProblem(title: String, in: difficulty: String, in: Problem) void, editProblem(ID) void, updateStatus(ID: String) void.
- **Submission**: ID, problemID, language String, runtimeMs float, errorMessage String, submittedDate Date, compile() boolean, rejudge() void.
- **Problem**: ID, title String, description String, difficulty String, referenceSolution String, evaluateSubmission(ID) EvaluationResult.
- **TestCase**: ID, input String, visible boolean, runAgainst(in: code String) ExecutionResult.
- **Client**: requestHint().

Behavior

- **SolutionVideo**: uploadVideo(), attachCaption(in: text String) void.
- **User**: getPlayCount() int.

- **Admin**: Manages submissions and problems (createProblem, editProblem, updateStatus).
- **Submission**: compile() and rejudge() methods for evaluation.
- **Problem**: evaluateSubmission() to assess user submissions.
- **TestCase**: runAgainst() to execute test cases.

Relationships

- **SolutionVideo** is linked to **User** (1 to 0..* for uploaded videos).
- **User** is linked to **Customer** (1 to 1).
- **Customer** is linked to **Submission** (1 to 0..* for submissions).
- **Admin** manages **Submission** (1 to 0..*).
- **Submission** contains **Problem** (0..* to 1).
- **Problem** contains **TestCase** (1 to 0..*).
- **Client** interacts with **SolutionVideo** (1 to 0..* for requesting hints).

Cardinality of Relationships

- SolutionVideo to User: 1 to 0..* (one user can upload multiple videos).
- User to Customer: 1 to 1 (each user is associated with one customer).
- Customer to Submission: 1 to 0..* (one customer can have multiple submissions).
- Admin to Submission: 1 to 0..* (one admin manages multiple submissions).
- Submission to Problem: 0..* to 1 (multiple submissions can relate to one problem).
- Problem to TestCase: 1 to 0..* (one problem can have multiple test cases).
- Client to SolutionVideo: 1 to 0..* (one client can request hints for multiple videos).