Online-Judge System

Minor Project

Functionalities

1. User Authentication (Login/SignUp) & Authorization.
2. Problem Contribution
   - Users can contribute competitive programming problems along with test cases to evaluate the submissions.
3. Problem Submission
   - Users can submit the solutions to the problems available on the website.
4. Evaluation
   - An online-judge will support 4 basic programming languages - C, C++, Java, Python.
   - Users' submissions will be evaluated against the test cases submitted by the problem contributor and appropriate verdict will be returned as an output.
   - For example, Time Limit Exceeded, Memory Limit Exceeded, Compilation Error, Runtime Error, Wrong Answer and Accepted.
5. Dashboard and View User Submissions
   - Users can view their submissions, Dashboard will have basic info of the user and charts or graphs for the various difficulties (easy, medium, hard), tags (binary search, dynamic programming etc.) of the problems and verdicts received by the user.
6. Search, Filter, Pagination
   - Users can search problems by name or tags through various pages on the website.
7. Leaderboard
   - Users can view the leaderboard based on number of problems solved, acceptance ratio, number of problems with each tag etc.

Tools & Technologies

Front-end: ReactJS
Back-end: NodeJS, Express, Spring Boot, Bash
Database: MongoDB
Deployment: Docker, AWS EC2

Database Schemas

Problems

```
{
 "title": "problem",
 "properties": {
  "__v": {
   "bsonType": "int"
  },
  "_id": {
   "bsonType": "objectId"
  },
  "author": {
   "bsonType": "string"
  },
  "countAC": {
   "bsonType": "int"
  },
  "countTotal": {
   "bsonType": "int"
  },
  "explanation": {
   "bsonType": "string"
  },
  "memory": {
   "bsonType": "int"
  },
  "name": {
   "bsonType": "string"
  },
  "sampleTestcase": {
   "bsonType": "array",
   "items": {
    "bsonType": "object",
    "properties": {
     "_id": {
      "bsonType": "objectId"
     },
     "input": {
      "bsonType": "string"
     },
     "output": {
      "bsonType": "string"
     }
    } } },
 "statement": {
    "bsonType": "string"
  },
  "systemTestcase": {
   "bsonType": "array",
   "items": {
    "bsonType": "object",
    "properties": {
     "_id": {
      "bsonType": "objectId"
     },
     "input": {
      "bsonType": "string"
     },
     "output": {
      "bsonType": "string"
     }
    }
   }
  },
  "tags": {
   "bsonType": "array",
   "items": {
    "bsonType": "string"
   }
  },
  "time": {
   "bsonType": "int"
  }
 }
}
```

Submissions


```
{
 "title": "submission",
 "properties": {
  "__v": {
   "bsonType": "int"
  },
  "_class": {
   "bsonType": "string"
  },
  "_id": {
   "bsonType": "objectId"
  },
  "code": {
   "bsonType": "string"
  },
  "date": {
   "bsonType": "date"
  },
  "lang": {
   "bsonType": "string"
  },
  "language": {
   "bsonType": "string"
  },
  "problemName": {
   "bsonType": "string"
  },
  "result": {
   "bsonType": "array",
   "items": {
    "bsonType": "object",
    "properties": {
     "_id": {
      "bsonType": "objectId"
     },
     "memory": {
      "bsonType": "int"
     },
     "time": {
      "bsonType": "int"
     },
     "verdict": {
      "bsonType": "string"
     }
    }
   }
  },
  "userId": {
   "bsonType": "objectId"
  },
  "verdict": {
   "bsonType": "string"
  }
 }
}
```


There are mainly 3 collections in MongoDB - Problems, Submissions and Users

Relationships between Collections:

Users - Submissions : One-to-many
Users - Problems : One-to-many
Problems - Submissions : One-to-many

Database Schema Diagram
DB Schema Diagram

Users


```
{
 "title": "user",
 "properties": {
  "_class": {
   "bsonType": "string"
  },
  "_id": {
   "bsonType": "objectId"
  },
  "contact": {
   "bsonType": "string"
  },
  "country": {
   "bsonType": "string"
  },
  "date": {
   "bsonType": "string"
  },
  "description": {
   "bsonType": "string"
  },
  "email": {
   "bsonType": "string"
  },
  "firstName": {
   "bsonType": "string"
  },
  "lastName": {
   "bsonType": "string"
  },
  "password": {
   "bsonType": "string"
  },
  "username": {
   "bsonType": "string"
  }
 }
}
```


React Component Diagram

Dependency Graph

WorkFlow

Workflow