CLASS-BASED MODELING FOR PROGRAMMING PLATFORM

This Chapter is intended to describe class based modeling of “**Programming Platform**”.

CLASS BASED MODELING CONCEPT

Class-based modeling represents the objects that the system will manipulate, the operations that will applied to the objects, relationships between the objects and the collaborations that occur between the classes that are defined.

GENERAL CLASSIFICATION

To identify the potential classes, we have first selected the nouns from the solution space of the story. These were then characterized in seven general classification. The seven general characteristics are as follows

1. External entities
2. Things
3. Events
4. Roles
5. Organizational units
6. Places
7. Structures

Following are the specifications of the nouns according to the general classifications:

|  |  |  |
| --- | --- | --- |
| Serial No | Noun | General Classification |
|  | Authentication | 3,5 |
|  | Problem set | 2,3,5,7 |
|  | Contest | 2,3,5,6,7 |
|  | User | 4,5,7 |
|  | Administrator | 4,5,7 |
|  | Problem Solver | 1,4,5,7 |
|  | Username |  |
|  | Email |  |
|  | Password |  |
|  | Recovery pin |  |
|  | Institute |  |
|  | Registration number |  |
|  | Designation |  |
|  | Problem |  |
|  | Description file |  |
|  | Input file |  |
|  | Solution file |  |
|  | Duration |  |
|  | Time limit |  |
|  | Language |  |
|  | Verdict |  |
|  | Wrong answer |  |
|  | Code |  |
|  | Submission | 2,5,7 |
|  | Submission file |  |
|  | Compiler |  |
|  | Timestamp |  |
|  | Starting time |  |
|  | Contest name |  |
|  | Rank | 2,7 |
|  | No of problems solved |  |
|  | Profile | 2,7 |
|  |  |  |

SELECTION CRITERIA

The potential classes were then selected as classes by six Selection Criteria. A potential class becomes a class when it fulfills all six characteristics.

1. Retain information
2. Needed services
3. Multiple attributes
4. Common attributes
5. Common operations
6. Essential requirements

|  |  |  |
| --- | --- | --- |
| **No** | **Noun** | **Selection criteria** |
|  | Authentication | 3 |
|  | Problem set | 1, 3-5 |
|  | Contest | 1, 3-5 |
|  | User | 1-5 |
|  | Administrator | 1-5 |
|  | Problem Solver | 1-5 |
|  | Submission | 1, 3-5 |
|  | Rank | 3-5 |
|  | Profile | 1, 3-5 |

ASSOCIATE NOUN AND VERB IDENTIFICATION

We will now identify the nouns and verbs associated with the potential classes to better find out the attributes and methods of each class.

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| --- | --- | --- | --- |
| No | Potential class | Noun | Verb |
|  | Authentication | Problem solver, Administrator | Log in, sign up, recover account and log out. |
|  | Problem set | Problem name, time limit, question file, input file, solution file, problem id. | Set new problem, remove problem, display problem set. |
|  | Contest | Contest id, contest name, duration, starting time. | Set new contest remove contest, modify contest, display contests, show rank of a contest. |
|  | User | User name, password, recovery pin, user type, institute. | Create new user |
|  | Administrator | User name, password, recovery pin, user type, institute, designation. | Managing contest, managing problem |
|  | Problem solver | User name, password, recovery pin, user type, institute, registration number. | Participating in contest, submitting code, check submission status. |
|  | Submission | Submission language, verdict, submission code. | Receiving code, compiling and running code, giving verdict. |
|  | Rank | User, number of problems solved, contest id | Calculating number of problems solved by a user in a contest, calculating rank. |
|  | Profile | User | Show profile and modify profile. |

Attribute Identification

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| --- | --- | --- |
| No | Name | Attribute |
|  | Authentication | username  password  recoveryPin  userType  institute |
|  | User | username  password  recoveryPin  userType  institute |
|  | Administrator | username  password  recoveryPin  userType  institute  designation |
|  | Problem solver | username  password  recoveryPin  userType  institute  registrationNumber |
|  | Contest | contestId  contestName  startingTime  duration |
|  | Problem | problemName  timeLimit  questionFile  inputFile  solutionFile |
|  | Submission | submissionLanguage  verdict  submissionCode |
|  | Rank | user  numberOfProblemsSolved  contest id |
|  | Profile | user |

Method Identification

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| --- | --- | --- |
| No | Class | Methods |
|  | Authentication | * signUp() * login() * recoverAccount() * logout() |
|  | Problem Set | * addProblem() * removeProblem() * displayProblem() |
|  | Contest | * showContest() * createContest() * removeContest() * modifyContest() |
|  | User | * createUser() |
|  | Administrator | * prepareContest() * removeContest() * modifyContest() * showResult() * displayProblem() |
|  | Problem solver | * checkSubmission() * submitCode() * participateInContest() |
|  | Submission | * matchWithSolutionFile() * compileCode() * runCode() * giveVerdict() * receiveCode() |
|  | Rank | * showRankOfContest() |
|  | Profile | * modifyProfile() * showProfile() |

Class card

|  |  |
| --- | --- |
| Authentication | |
| Attribute | Method |
| * username * password * recoveryPin * userType * institute | * signUp() * login() * recoverAccount() * logout() |
| Responsibilities | Collaboration |
| * Register a user * Login to the system * Recover a user account * Logout from the system | Validation  DBConnector |

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| --- | --- |
| UserProfile | |
| Attribute | Method |
| * username * password * recovery pin * userType * institute | * modifyProfile() * showProfile() |
| Responsibilities | Collaboration |
| * Showing user profile * Modifying user profile | Validation  DBConnector |

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| --- | --- |
| Administrator | |
| Attribute | Method |
| * User * Designation | * prepareContest() * removeContest() * modifyContest() * showResult() * displayProblem() |
| Responsibilities | Collaboration |
| * Prepare new contest * Remove contest * Modify contest | Contest  Problem |

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| --- | --- |
| Problem solver | |
| Attribute | Method |
| * User * Registration number | * checkSubmission() * submitCode() * participateInContest() |
| Responsibilities | Collaboration |
| * Display the submissions * Submit code * Participate in contest | Database  Problem  Contest  Submission |

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| --- | --- |
| Contest | |
| Attribute | Method |
| * Problem * contestId * contestName * startingTime * duration * Database | * showContest() * createContest() * removeContest() * modifyContest() * showRankOfContest() |
| Responsibilities | Collaboration |
| * Showing all contests * Creating new contest * Removing a contest * Updating a contest * Showing rank of a contest | Database  Problem  Administrator |

|  |  |
| --- | --- |
| Problem | |
| Attribute | Method |
| * problemName * timeLimit * questionFile * inputFile * solutionFile * Database | * addProblem() * removeProblem() * displayProblem() |
| Responsibilities | Collaboration |
| * Adding a new problem * Removing a problem * Displaying problem of a contest. | Database  System |

|  |  |
| --- | --- |
| Validation | |
| Attribute | Method |
|  | * validateInput() |
| Responsibilities | Collaboration |
| * Validate data | Problem solver  Contest  Problem  Submission |

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| --- | --- |
| Submission | |
| Attribute | Method |
| * submissionLanguage * verdict * submissionCode | * matchWithSolutionFile() * compileCode() * runCode() * giveVerdict() * receiveCode() |
| Responsibilities | Collaboration |
| * Compiling the submitted code * Running the compiled code * Giving a verdict | Problem  Contest  Database  Problem solver |

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| --- | --- |
| DBConnector | |
| Attribute | Method |
|  | * connectToDatabase() |
| Responsibilities | Collaboration |
| * connecting to database |  |