# CHAPTER – 6 CLASS BASED MODELING

This chapter describes the class-based model for Assignment Management System.

## 6.1 INTRODUCTION

Class-based methods for requirements modelling use common concepts of object-oriented programming to craft an impression of an application that can be understood by nontechnical stakeholders. As the requirements model is refined and expanded, it evolves into a specification that can be used by software engineers in the creation of the software design. Class-based modelling represents:

1. The objects the system will manipulate
2. The operations (methods or services) that will be applied for effective manipulation
3. The relationships between the objects
4. The collaboration that occur between the classes

## 6.2 IDENTIFYING ANALYSIS CLASS

Classes are identified by underlining each noun or noun phrase and plotting it into a simple table. If the class (noun) is required to implement a solution, then it becomes a part of the solution space. Otherwise if the noun is used only to describe a solution, it is regarded as a part of the problem space. Once all the nouns have been isolated, General classification and Selection is done.

### 6.2.1 GENERAL CLASSIFICATION

Nouns belonging to the solution space should exhibit any of the following criteria to be considered as a class. The 7 general characteristics are stated below:

1. *External entities:* Other systems, devices, people that produce or consume information to be used by a computer-based system
2. *Things*: Reports, displays, letters, signals that are a part of the information domain for the problem.
3. *Events*: Actions or transfers (a property transfer or the completion of a series of robot movements) that occur within the context of system operation.
4. *Roles*: Responsibilities played by the people who interact with the system.
5. *Organizational units:* Divisions, groups, teams that are relevant to an application.
6. *Places:* Platform that establishes the context of the problem and overall function of the system.
7. *Structures*: Something that defines a class of objects or related classes of objects.

|  |  |  |
| --- | --- | --- |
| Serial Number | Noun | General classification |
| 1 | User | 4,5,7 |
| 2 | Instructor | 4,5,7 |
| 3 | Student | 4,5,7 |
| 4 | First name |  |
| 5 | Last name |  |
| 6 | Email |  |
| 7 | Phone number |  |
| 8 | Password |  |
| 9 | Sign up | 3,5 |
| 10 | Sign in | 3 |
| 11 | Database | 1 |
| 12 | Account recovery | 3 |
| 13 | Group | 5,7 |
| 14 | Group name |  |
| 15 | Section |  |
| 16 | Subject |  |
| 17 | Code |  |
| 18 | Assignment | 2,7 |
| 19 | Format |  |
| 20 | Time |  |
| 21 | Assignment submission | 3 |
| 22 | Assignment title |  |
| 23 | Assignment description |  |
| 24 | Deadline |  |
| 25 | File | 2 |
| 26 | Message | 3 |
| 27 | Comment | 3 |
| 28 | Post | 3 |
| 29 | Resubmission | 3 |
| 30 | Late submission | 3 |
| 31 | Plagiarism | 3 |
| 32 | Marks |  |
| 33 | Mark distribution | 3 |
| 34 | Authentication | 3,5 |
| 35 | Assignment management | 5,7 |
| 36 | Group management | 5,7 |
| 37 | Date |  |
| 38 | Message description |  |
| 39 | Comment description |  |
| 40 | Sign out | 3 |

## 6.2.2 Selection Criteria

Classes that fulfilled at least 3 characteristics of general classification are again reconsidered by six Selection Criteria. The six characteristics for the selection criteria are:

1. *Retained information:* The potential class will be useful during analysis only if information about it must be remembered so that the system can function.
2. *Needed services:* The potential class must have a set of identifiable operations that can change the value of its attributes in some way.
3. *Multiple attributes:* During requirement analysis, the focus should be on “major” information; a class with a single attribute may, in fact, be useful during design, but is probably better represented as an attribute of another class during the analysis activity.
4. *Common attributes:* A set of attributes can be defined for the potential class and these attributes apply to all instances of the class.
5. *Common operations:* A set of operations can be defined for the potential class and these operations apply to all instances of the class.
6. *Essential requirements:* External entities that appear in the problem space and produce or consume information essential to the operation of any solution for the system will almost always be defined as classes in the requirements model.

To be considered a legitimate class for inclusion in the requirements model, a potential object should satisfy all (or almost all) of these characteristics. The decision for inclusion of potential classes in the analysis model is somewhat subjective, and later evaluation may cause an object to be discarded or reinstated.

|  |  |  |
| --- | --- | --- |
| Serial number | Noun | Selection criteria |
| 1 | User | 1,2,3,4,5 |
| 2 | Instructor | 1,2,3,4,5 |
| 3 | Student | 1,2,3,4,5 |
| 4 | Sign up | 5 |
| 5 | Sign in | 5 |
| 6 | Account recovery | 5 |
| 7 | Sign out | 5 |
| 8 | Database | 6 |
| 9 | Group | 3,4,5 |
| 10 | Authentication | 3,4,5 |
| 11 | Assignment | 3,4,5 |

## ASSOCIATE NOUN WITH VERB

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

|  |  |  |  |
| --- | --- | --- | --- |
| No | Class name | Nouns | Verbs |
| 1 | User | firstname, lastname, username, email, phone number, password | register, recover account, sign in, sign out |
| 2 | Instructor | firstname, lastname, username, email, phone number, password | Create group, register, sign in, recover account, sign out, Post assignment, give format, fill assignment, attach files, post announcement, search assignment, download assignment, view assignment, filter assignment, check plagiarism, distribute mark, comment, message, update group, remove group. |
| 3 | Student | firstname, lastname, username, email, phone number, password | Register, sign in, sign out, account recovery, join group, submit assignment, view assignment, download assignment, filter assignment, comment, message, cancel submission, resubmit assignment, |
| 4 | Authentication | N/A | Data entry, validity check, checking running process. |
| 5 | Database | N/A | Store/provide information |
| 6 | Assignment | Assignment id, title, description, file | N/A |
| 7 | Group | Group id, subject, code, section | N/A |

## ATTRIBUTE SELECTION

|  |  |  |
| --- | --- | --- |
| No | Class | Attributes |
| 1 | User | firstNmae  lastName  userName  Password  Email  Phone number |
| 2 | Instructor | firstNmae  lastName  userName Password  Email  Phone number  Type |
| 3 | Student | firstNmae  lastName  userName  Password  Email  Phone number  Type |
| 4 | Authentication | Name  Password  Email  Phone number |
| 5 | Database | DB\_name  Password  table\_Name  url |
| 6 | Assignment | Assignment id  Assignment title  Assignment description  Deadline |
| 7 | Group | Group id  Group code  Group name  Section  Subject |

## METHOD IDENTIFICATION

|  |  |  |
| --- | --- | --- |
| No | Class | Methods |
| 1 | Authentication | signIn()  signUp()  accountRecovery() |
| 2 | User | sendMessage()  receiveMessage()  logout()  createGroup()  filter()  post() |
| 3 | Instructor | distributeMarks()  checkPlagiarism()  createAssignment()  removeGroup()  updateGroup()  searchAssignment() |
| 4 | Student | submitAssignment()  resubmitAssignment()  joinGroup() |
| 5 | Assignment | toString() |
| 6 | Group | toString() |
| 7 | System | takeInput()  validateInput()  verifyInput()  generateId()  generateCode()  checkingFormatAndDeadline()  storeAssignment() |
| 8 | Database | insert()  view()  update()  remove()  retrieve() |

## CLASS CARDS

After identifying our final classes we have generated following class cards

|  |  |
| --- | --- |
| User | |
| Attributes | Methods |
| firstName  lastName  userName  email  password  phoneNumber | senndMessage()  receiveMessage()  signOut()  createGroup()  comment()  filter()  post() |
| Responsibilities | Collaborative class |
| * Sending message to users * Receiving message from users * Creating group * Commenting on the post * Filtering assignment * Making post * Sign out from system | System, Database, Group |

|  |  |
| --- | --- |
| Instructor | |
| Attributes | Methods |
| firstName  lastName  userName  email  password  phoneNumber  type | distributeMarks()  checkPlagiarism()  createAssignment()  removeGroup()  updateGroup()  searchAssignment() |
| Responsibilities | Collaborative class |
| * Creating assignment * Distributing mark * Checking plagiarism * Removing group * Updating group * Searching assignment | System, Database, Assignment |

|  |  |
| --- | --- |
| Student | |
| Attributes | Methods |
| firstName  lastName  userName  email  password  phoneNumber  type | submitAssignment()  resubmitAssignment()  joinGroup() |
| Responsibilities | Collaborative class |
| * Submitting assignment * Resubmitting mark * Joining to group | System, Database |

|  |  |
| --- | --- |
| Authentication | |
| Attributes | Methods |
| firstName  lastName  userName  email  password  phoneNumber  type | signIn()  signUp()  accountRecovery() |
| Responsibilities | Collaborative class |
| * Registration to the system * Log in to the system * Recovery of user account | System, Database, Instructor, Student |

|  |  |
| --- | --- |
| System | |
| Attributes | Methods |
| id  code | takeInput()  validateInput()  verifyInput()  generateId()  generateCode()  checkingFormatAndDeadline()  storeAssignment() |
| Responsibilities | Collaborative class |
| * Taking input * Validating Input * Generating id and class code * Checking format of assignment and deadline * Storing assignment | Database,User, Instructor, Student |

|  |  |
| --- | --- |
| Database | |
| Attributes | Methods |
| DB\_name  Password  table\_Name  url | insert()  view()  update()  remove()  retrieve() |
| Responsibilities | Collaborative class |
| * Storage system information * Manipulation of stored information | N/A |

|  |  |
| --- | --- |
| Assignment | |
| Attributes | Methods |
| Assignment id  Assignment title  Assignment description  Deadline | toString() |
| Responsibilities | Collaborative class |
| N/A | N/A |

|  |  |
| --- | --- |
| Group | |
| Attributes | Methods |
| Group id  Group code  Group name  Section  Subject | toString() |
| Responsibilities | Collaborative class |
| N/A | N/A |