# Chapter 6

# Class Based Model

In this chapter, we describe class based model of our proposed project “Expenditure Management System”.

## 6.1 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.

## 6.2 General Classification:

#### 6.2.1 Table: Properties of general classification

|  |  |
| --- | --- |
| Property Name | ID (G.C) |
| External entity | 1 |
| Things | 2 |
| Occurrences | 3 |
| Roles | 4 |
| Organizational units | 5 |
| Places | 6 |
| Structures | 7 |

## 6.3 Selection Criteria:

#### 6.3.1 Table: Properties of selection criteria

|  |  |
| --- | --- |
| Property Name | ID (S.C) |
| Retained information | 1 |
| Needed service | 2 |
| Multiple attributes | 3 |
| Common attributes | 4 |
| Common operations | 5 |
| Essential requirements | 6 |

### 6.4 Class Identification:

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| NID | Noun  (Potential class) | Problem/solution space | General Classification | Selection Criteria |
|  | Expenditure Management System | P | - | - |
|  | IIT | P | - | - |
|  | University of Dhaka | P | - | - |
|  | Transaction | P | - | - |
|  | \*Sector | S | 2, 3, 7 | 1, 3, 4, 6 |
|  | \*Director of IIT (Super Admin) | S | 4, 5 | 1, 2, 3, 4, 5, 6 |
|  | \*Teacher  (Sub Admin) | S | 4, 5 | 1, 2, 3, 4, 5, 6 |
|  | Field name | S | - | - |
|  | Field access key | S | - | - |
|  | Estimated amount | S | - | - |
|  | Annual budget report | P | - | - |
|  | Amount of expense | S | - | - |
|  | Approval | S | - | - |
|  | Proposal | P | - | - |
|  | Date of approval | S | - | - |
| NID | Noun  (Potential class) | Problem/solution space | General Classification | Selection Criteria |
|  | \*Proposed Sector | S | 2, 3, 7 | 1, 3, 4, 6 |
|  | Assigned field name | S | - | - |
|  | Assigned sector name | S | - | - |
|  | Spent amount | S | - | - |
|  | Special report | P | - | - |
|  | Spent fields | P | - | - |

Star (\*) sign indicates that there are selected for class. So, the classes are:

1. Director
2. Teacher
3. Sector
4. Proposed Sector
5. \*Sector List
6. \*Database

\*Infrastructure classes

## 6.5 Subject, Verb, Object/ Predicate Identification:

|  |  |  |
| --- | --- | --- |
| Subject | Verb | Object/Predicate |
| Director | add | sectors of expense |
| Director | add | field names, field access key and estimated amount |
| Director | assign | teachers with username, password, sector names, field access keys. |
| Teacher | propose | amount of expense corresponding to the assigned fields of the assigned sectors |
| Teacher | send | proposal to director |
| Director | approve/reject | proposal |
| Director | send | notification |
| Teacher | view | notification |
| Director | view | annual report/special report |
| Director | remove | assigned teachers |

## 6.6 Class Card:

|  |  |
| --- | --- |
| 1. **Director** | |
| Attributes | Methods |
| 1. directorId 2. userName 3. password | 1. authenticate() 2. register() 3. addSector() 4. viewSectors() 5. addField() 6. viewFields() 7. assign() 8. viewAssignees() 9. viewProposal() 10. review() 11. send() 12. remove() 13. viewReport() |
| Responsibilities | Collaborator Classes |
| 1. Authentication as super admin 2. Registration as super admin 3. Addition of sector 4. Addition of field of expense in a sector 5. Viewing existing sectors 6. Viewing existing fields of a sector 7. Assignment of teachers in specific fields of a specific sector 8. Viewing the assignee list 9. Viewing existing proposals 10. Reviewing a proposal 11. Sending notification 12. Removing assignee from the assignee list 13. Viewing generated reports | 1. Datasbase 2. Database 3. Sector List, Database 4. Sector, Database 5. Sector List, Database 6. Sector, Database 7. Teacher, Sector, Database 8. Teacher, Database 9. Proposed Sector, Database 10. Proposed Sector, Database 11. Proposed Sector, Database 12. Teacher, Database 13. Database |

|  |  |
| --- | --- |
| 1. **Teacher** | |
| Attributes | Methods |
| 1. teacherId 2. userName 3. password 4. directorId 5. accessable<sectorId, listOfFields> | 1. authenticate() 2. register() 3. propose() 4. send() 5. view() |
| Responsibilities | Collaborator Classes |
| 1. Authentication as super admin 2. Registration as super admin 3. Proposing a new amount of expense 4. Sending proposal to the director 5. Viewing notification or feedback | 1. Datasbase 2. Database 3. Proposed Sector, Database 4. Proposed Sector, Director, Database 5. Proposed Sector, Database |

|  |  |
| --- | --- |
| 1. **Sector List** | |
| Attributes | Methods |
| 1. sectorListId 2. sectorName 3. directorId | 1. get() 2. set() |
| Responsibilities | Collaborator Classes |
| 1. Getting attributes from database 2. Setting attributes to database | 1. Database 2. Database |

|  |  |
| --- | --- |
| 1. **Sector** | |
| Attributes | Methods |
| 1. fieldAccesKey 2. fieldName 3. estimatedAmount 4. spentAmount 5. dateOfApproval 6. teacherId 7. directorId | 1. get() 2. set() |
| Responsibilities | Collaborator Classes |
| 1. Getting attributes from database 2. Setting attributes to database | 1. Database 2. Database |

|  |  |
| --- | --- |
| 1. **Proposed Sector** | |
| Attributes | Methods |
| 1. proposedSectorId 2. assignedFieldName 3. assignedSectorName 4. amountOfExpense 5. approval 6. teacherId 7. directorId | 1. get() 2. set() |
| Responsibilities | Collaborator Classes |
| 1. Getting attributes from database 2. Setting attributes to database | 1. Database 2. Database |

|  |  |
| --- | --- |
| 1. **Database** | |
| Attributes | Methods |
| ---- | 1. create() 2. update() 3. delete() 4. retrieve() |
| Responsibilities | Collaborator Classes |
| 1. Creating an element 2. Updating the element 3. Deleting an element 4. Retrieving element(s) | 1. --- 2. --- 3. --- 4. --- |

## 6.7 CRC Diagram:



#### 6.7.1 Figure CRC Diagram