

Design Stack Overflow

We'll cover the following

- Requirements and Goals of the System
- Use-case Diagram
- Class diagram
- Activity diagrams
- Sequence Diagram
- Code

Stack Overflow is one of the largest online communities for developers to learn and share their knowledge. The website provides a platform for its users to ask and answer questions, and through membership and active participation, to vote questions and answers up or down. Users can edit questions and answers in a fashion similar to a [wiki](#).

Users of Stack Overflow can earn reputation points and badges. For example, a person is awarded ten reputation points for receiving an “up” vote on an answer and five points for the “up” vote of a question. The can also receive badges for their valued contributions. A higher reputation lets users unlock new privileges like the ability to vote, comment on, and even edit other people’s posts.



stackoverflow

Requirements and Goals of the System

We will be designing a system with the following requirements:

1. Any non-member (guest) can search and view questions. However, to add or upvote a question, they have to become a member.
2. Members should be able to post new questions.
3. Members should be able to add an answer to an open question.
4. Members can add comments to any question or answer.
5. A member can upvote a question, answer or comment.
6. Members can flag a question, answer or comment, for serious problems or moderator attention.
7. Any member can add a [bounty](#) to their question to draw attention.
8. Members will earn [badges](#) for being helpful.
9. Members can vote to [close](#) a question; Moderators can close or reopen any question.
10. Members can add [tags](#) to their questions. A tag is a word or phrase that describes the topic of the question.
11. Members can vote to [delete](#) extremely off-topic or very low-quality questions.
12. Moderators can close a question or undelete an already deleted question.
13. The system should also be able to identify most frequently used tags in the questions.

Use-case Diagram

We have five main actors in our system:

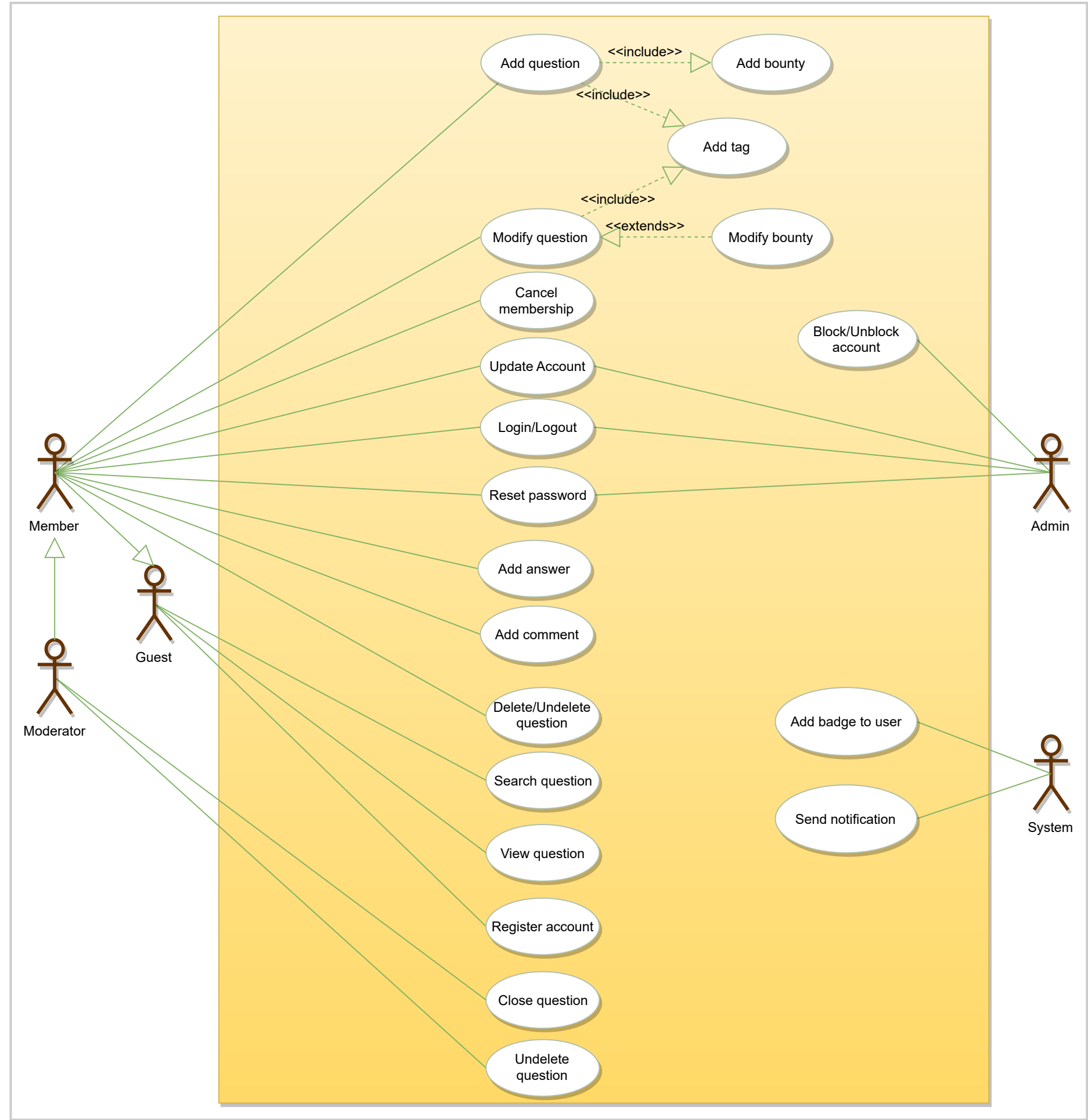
- **Admin:** Mainly responsible for blocking or unblocking members.



- **Guest:** All guests can search and view questions.
- **Member:** Members can perform all activities that guests can, in addition to which they can add/remove questions, answers, and comments. Members can delete and un-delete their questions, answers or comments.
- **Moderator:** In addition to all the activities that members can perform, moderators can close/delete/undelete any question.
- **System:** Mainly responsible for sending notifications and assigning badges to members.

Here are the top use cases for Stack Overflow:

1. Search questions.
2. Create a new question with bounty and tags.
3. Add/modify answers to questions.
4. Add comments to questions or answers.
5. Moderators can close, delete, and un-delete any question.



Use case diagram

Class diagram

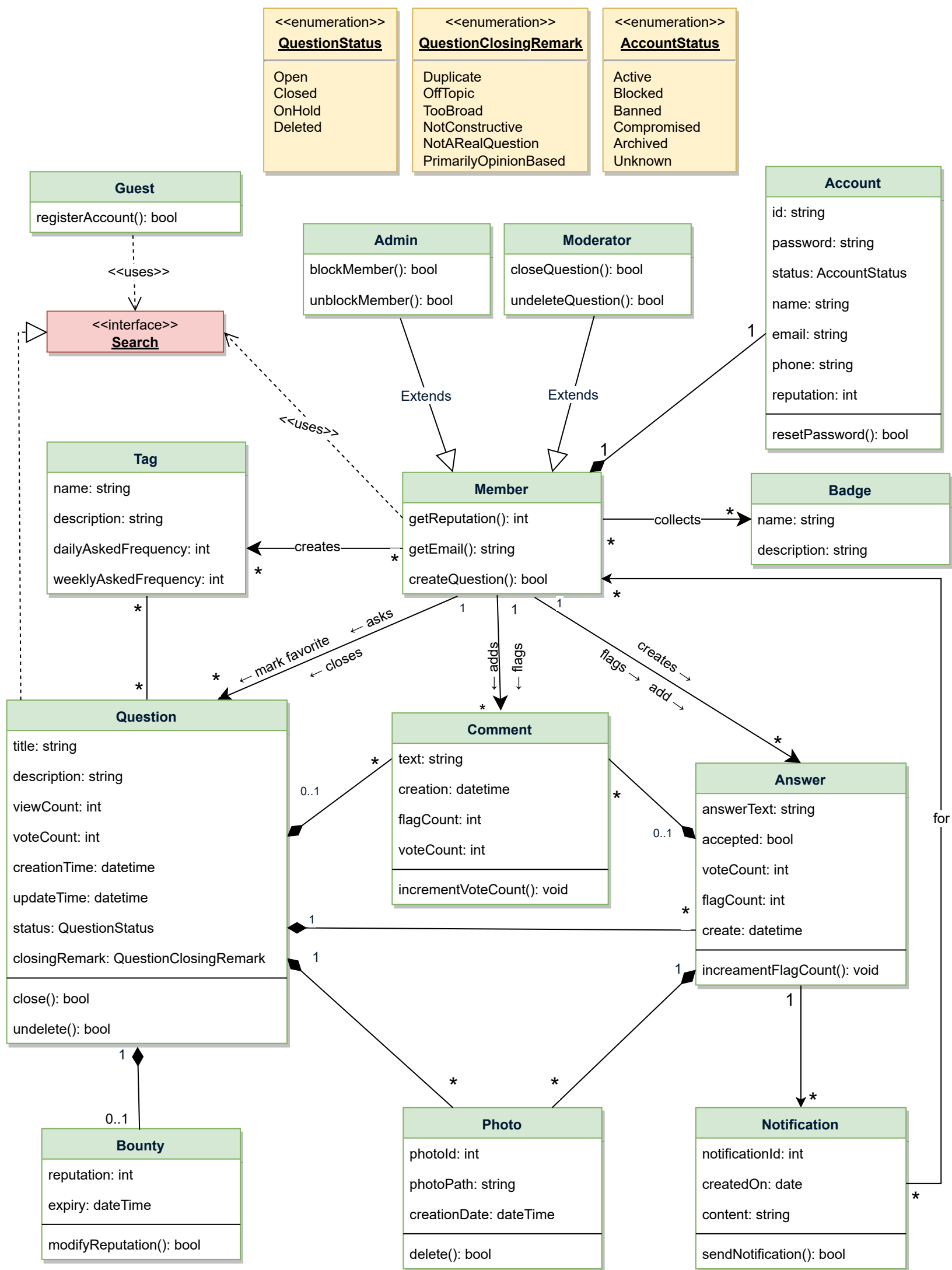
Here are the main classes of Stack Overflow System:

- **Question:** This class is the central part of our system. It has attributes like Title and Description to define the question. In addition to this, we will track the number of times a question has been viewed or voted on. We should also track the status of a

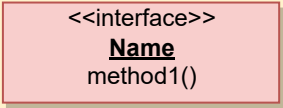


question, as well as closing remarks if the question is closed.

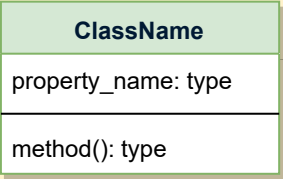
- **Answer:** The most important attributes of any answer will be the text and the view count. In addition to that, we will also track the number of times an answer is voted on or flagged. We should also track if the question owner has accepted an answer.
- **Comment:** Similar to answer, comments will have text, and view, vote, and flag counts. Members can add comments to questions and answers.
- **Tag:** Tags will be identified by their names and will have a field for a description to define them. We will also track daily and weekly frequencies at which tags are associated with questions.
- **Badge:** Similar to tags, badges will have a name and description.
- **Photo:** Questions or answers can have photos.
- **Bounty:** Each member, while asking a question, can place a bounty to draw attention. Bounties will have a total reputation and an expiry date.
- **Account:** We will have four types of accounts in the system, guest, member, admin, and moderator. Guests can search and view questions. Members can ask questions and earn reputation by answering questions and from bounties.
- **Notification:** This class will be responsible for sending notifications to members and assigning badges to members based on their reputations.



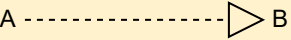
UML conventions



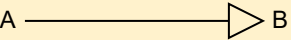
Interface: Classes implement interfaces, denoted by Generalization.



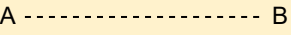
Class: Every class can have properties and methods.
Abstract classes are identified by their *Italic* names.



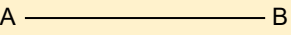
Generalization: A implements B.



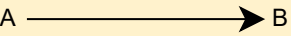
Inheritance: A inherits from B. A "is-a" B.



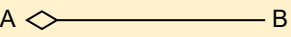
Use Interface: A uses interface B.



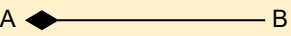
Association: A and B call each other.



Uni-directional Association: A can call B, but not vice versa.



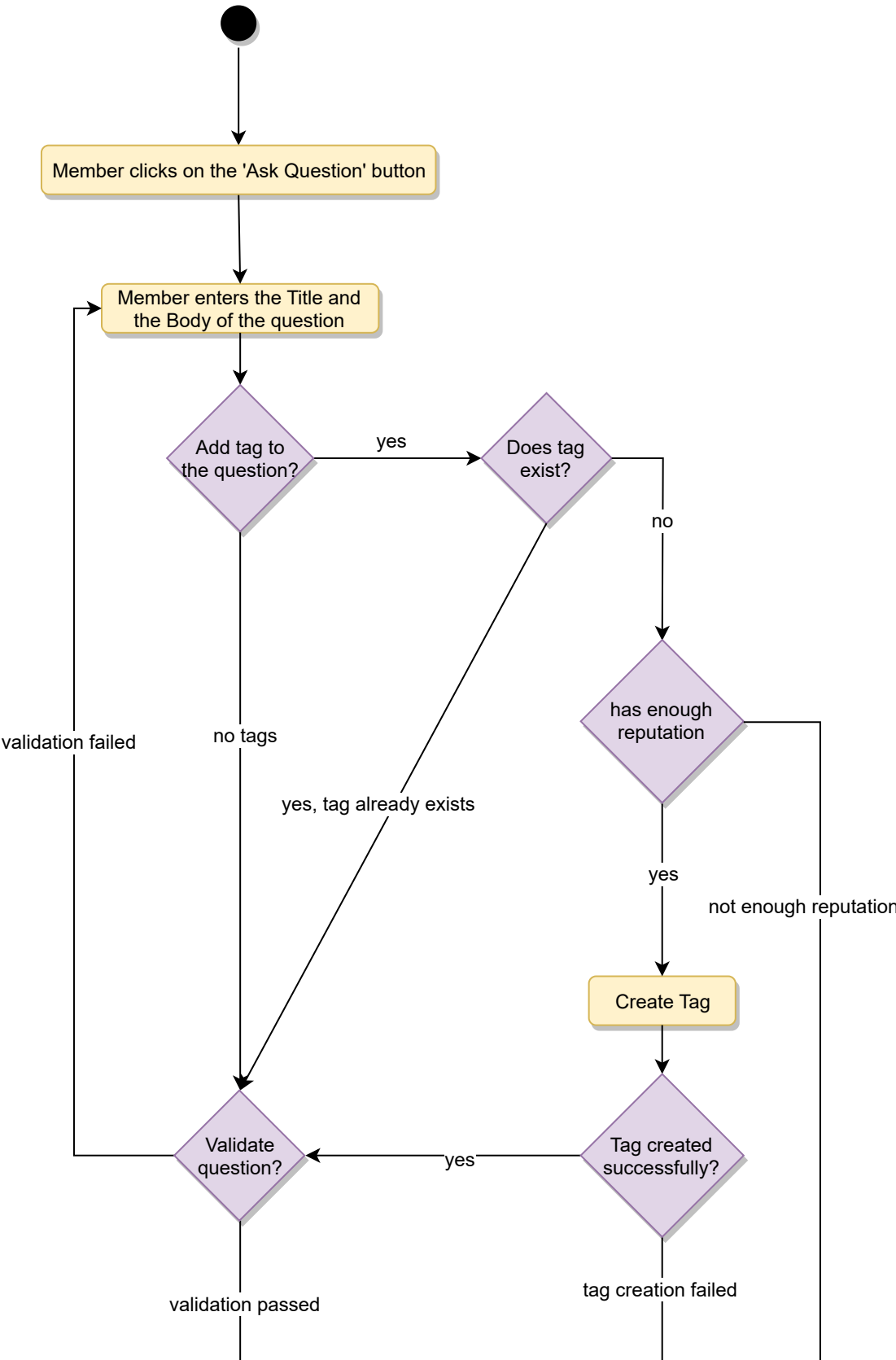
Aggregation: A "has-an" instance of B. B can exist without A.

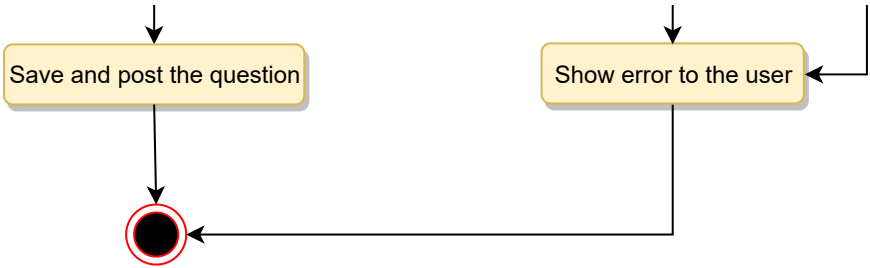


Composition: A "has-an" instance of B. B cannot exist without A.

Activity diagrams

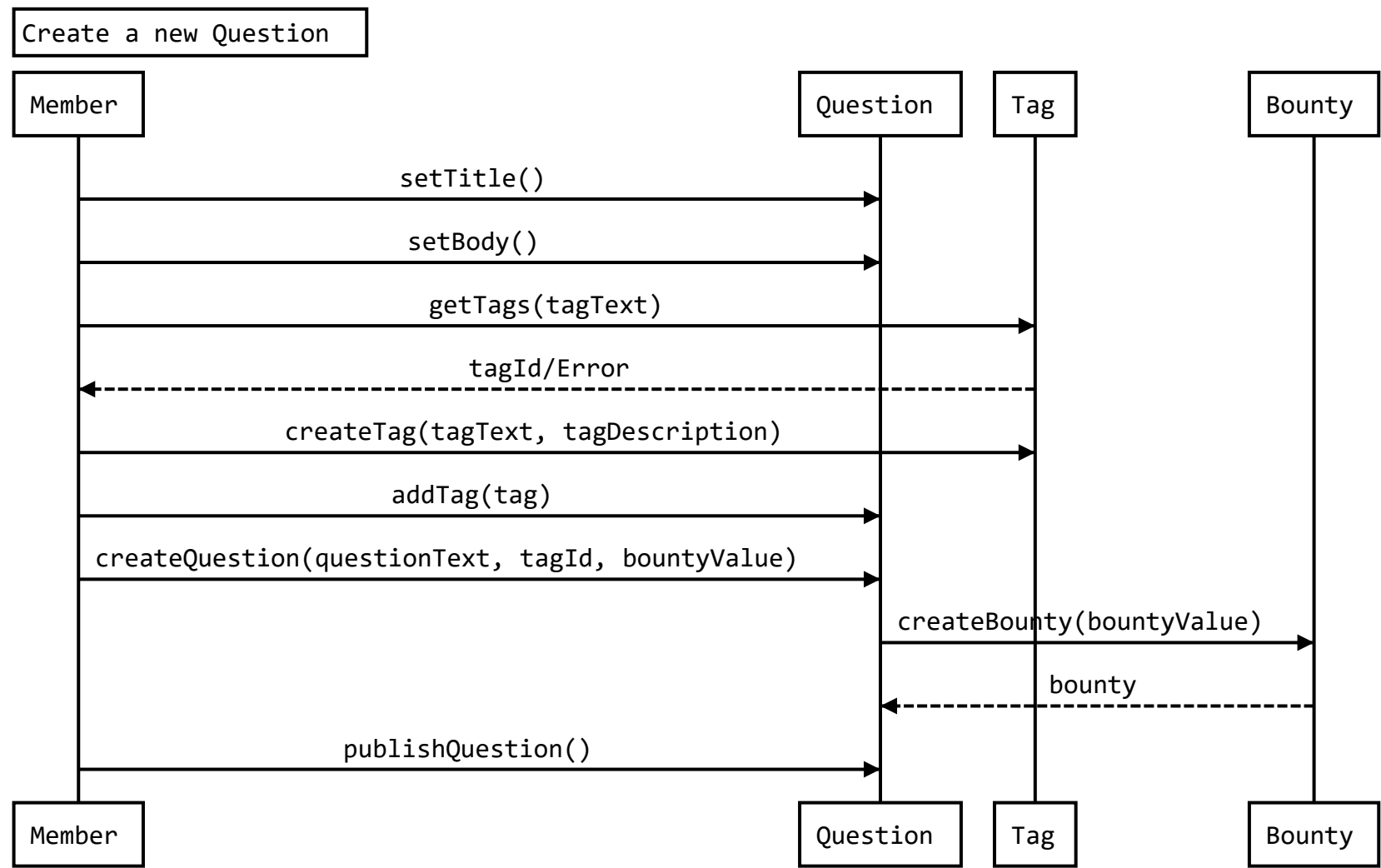
Post a new question: Any member or moderator can perform this activity. Here are the steps to post a question:





Sequence Diagram

Following is the sequence diagram for creating a new question:



Code

Here is the high-level definition for the classes described above.

Enums, data types, and constants: Here are the required enums, data types, and constants:



```
1 class QuestionStatus(Enum):
2     OPEN, CLOSED, ON_HOLD, DELETED = 1, 2, 3, 4
3
4
5 class QuestionClosingRemark(Enum):
6     DUPLICATE, OFF_TOPIC, TOO_BROAD, NOT_CONSTRUCTIVE, NOT_A_REAL_QUESTION, PRIMARILY_OPINION_BASED = 1, 2, 3, 4, 5, 6
7
8
9 class AccountStatus(Enum):
10     ACTIVE, CLOSED, CANCELED, BLACKLISTED, BLOCKED = 1, 2, 3, 4, 5
```

Account, Member, Admin, and Moderator: These classes represent the different people that interact with our system:



```
1 # For simplicity, we are not defining getter and setter functions. The reader can
2 # assume that all class attributes are private and accessed through their respective
3 # public getter methods and modified only through their public methods function.
4
5
6 class Account:
7     def __init__(self, id, password, name, address, email, phone, status=AccountStatus.Active):
8         self.id = id
```



```
8     self.__id = id
9     self.__password = password
10    self.__name = name
11    self.__address = address
12    self.__email = email
13    self.__phone = phone
14    self.__status = status
15    self.__reputation = 0
16
17    def reset_password(self):
18        None
19
20
21    class Member:
22        def __init__(self, account):
23            self.__account = account
24            self.__badges = []
25
26        def get_reputation(self):
27            return self.__account.get_reputation()
28
29        def get_email(self):
30            return self.__account.get_email()
31
```

Badge, Tag, and Notification: Members have badges, questions have tags and notifications:

 Java

 Python

```
1 class Badge:
2     def __init__(self, name, description):
3         self.__name = name
4         self.__description = description
5
6
7 class Tag:
8     def __init__(self, name, description):
9         self.__name = name
10        self.__description = description
11        self.__daily_asked_frequency = 0
12        self.__weekly_asked_frequency = 0
13
14 # import datetime
15
16
17 class Notification:
18     def __init__(self, id, content):
19         self.__notification_id = id
20         self.__created_on = datetime.datetime.now()
21         self.__content = content
22
23     def send_notification(self):
24         None
```



Photo and Bounty: Members can put bounties on questions. Answers and Questions can have multiple photos:

 Java

 Python

```
1 import datetime
2
3 class Photo:
4     def __init__(self, id, path, member):
5         self.__photo_id = id
6         self.__photo_path = path
7         self.__creation_date = datetime.datetime.now()
8         self.__creating_member = member
9
10    def delete(self):
11        None
12
13 # import datetime
14
15
```



Tt





```
15
16 class Bounty:
17     def __init__(self, reputation, expiry):
18         self.__reputation = reputation
19         self.__expiry = expiry
20
21     def modify_reputation(self, reputation):
22         None
23
24
```

Question, Comment and Answer: Members can ask questions, as well as add an answer to any question. All members can add comments to all open questions or answers:



```
1 from abc import ABC, abstractmethod
2
3 class Search(ABC):
4     def search(self, query):
5         None
6
7 import datetime
8
9 class Question(Search):
10     def __init__(self, title, description, bounty, asking_member):
11         self.__title = title
12         self.__description = description
13         self.__view_count = 0
14         self.__vote_count = 0
15         self.__creation_time = datetime.datetime.now()
16         self.__update_time = datetime.datetime.now()
17         self.__status = QuestionStatus.OPEN
18         self.__closing_remark = QuestionClosingRemark.DUPLICATE
19
20         self.__bounty = bounty
21         self.__asking_member = asking_member
22         self.__photos = []
23         self.__comments = []
24         self.__answers = []
25
26     def close(self):
27         None
28
29     def undelete(self):
30         None
31
```



← Back

Next →

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✓ Completed