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# **Software Requirements Specification**

**for**  
**UIC Teamwork Contribution  
Assessment System**

**Version 1.3 approved**

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**AIR**

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## Revision History

Name	Date	Reason For Changes	Version	
YuePeng YiTao HongYue RongKai	LONG, QIU, SHEN, LIU	2020-03-06	The first version	1.0
YuePeng YiTao HongYue RongKai	LONG, QIU, SHEN, LIU	2020-03-14	Update System Feature 3.1-3.3 and User Interface for 3.1-3.3	1.1
YuePeng YiTao HongYue RongKai	LONG, QIU, SHEN, LIU	2020-03-22	Update System Feature 3.2 Add System Feature 3.4-3.10 and their corresponding User Interface graphs	1.2
YuePeng YiTao HongYue RongKai	LONG, QIU, SHEN, LIU	2020-03-30	Update System Feature 3.4 and 3.5 Update almost all User Interface graphs Add Class Diagram and Sequence Diagram for System Feature 3.6	1.3

# 1. Introduction

## 1.1 Purpose

This document is for the project named "UIC Teamwork Contribution Assessment System" which is developed by Group AIR. The document will cover the introduction of the document, overall description, external requirements, main features and other non-functional requirements of the product.

This document aims to help developers to conveniently develop the application. And for developers, it specifies the major features this product will provide.

## 1.2 Document Conventions

This document will use "Times New Roman" as font for both first-level and second-level titles, of which the font sizes are 18 and 14 respectively. And titles will be highlighted by bold.

The main body of this document is written in the font "Arial" with the font size 11. Also, this document will use **bold text** to emphasize the important content when necessary, and *italic text* to indicate those company names and product names mentioned.

For the acronyms mentioned in this document, please refer to Appendix A for details.

## 1.3 Intended Audience and Reading Suggestions

The document is mainly written for clients, developers and testers.

- For developers, please read the whole document
- For clients, we suggest that they can refer to the content in **part 2** and **main features of the product in part 3**
- For testers, the content in **part 2** and **non-functional requirements in part 5** are recommended

## 1.4 Project Scope

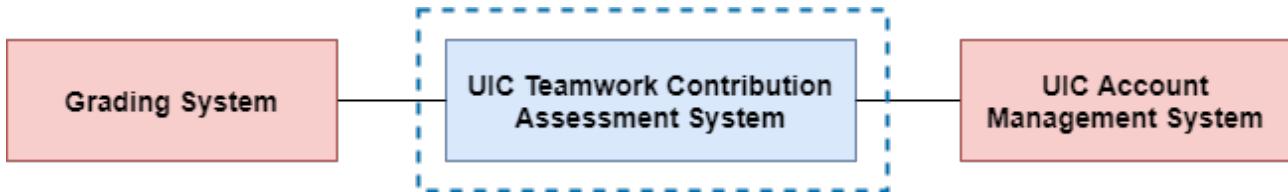
This product aims to bring UIC staffs and students a better and more convenient platform to do the record, management and assessment about teamwork contribution. With this application, teachers can easily specify the group allocation, manage the statistics uploaded by students and get the reference of teamwork contribution for grading students, while students can do submission of each assignment or group project, and assess their classmates' work clearly.

## 1.5 References

Workshop III Teamwork Project V3

## 2. Overall Description

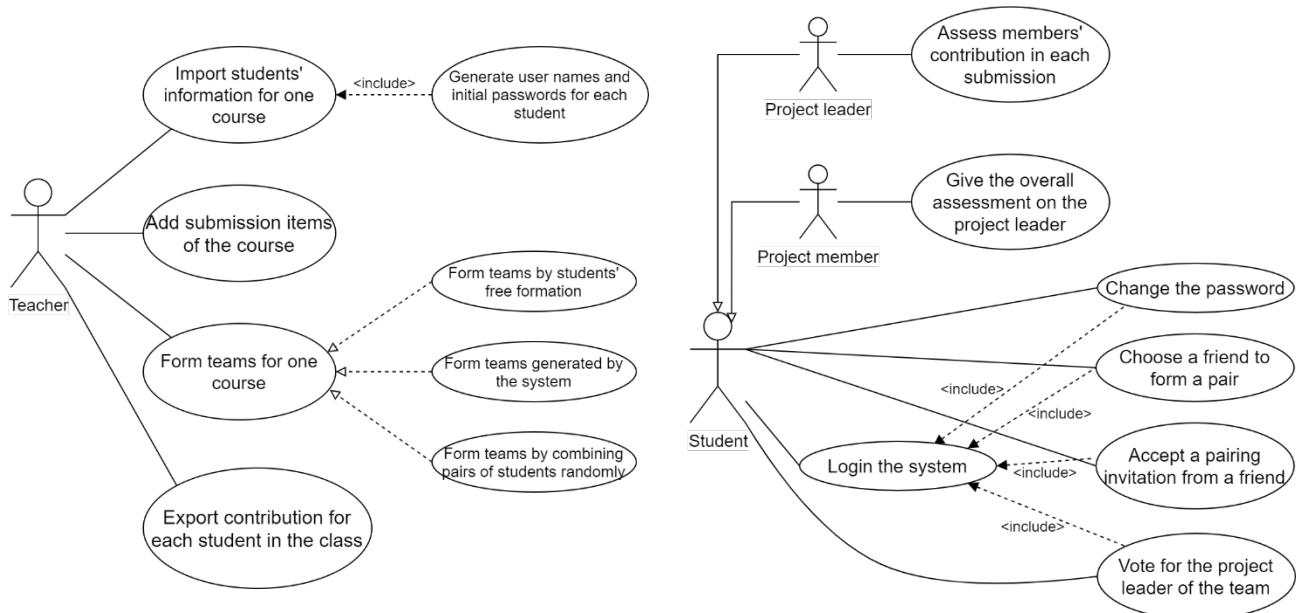
### 2.1 Product Perspective



The system should be used as an assistant tool for grade assessment. User accounts can be imported from other systems such as an account management system. Teamwork contribution can be exported and be used in another grading system.

### 2.2 Product Features

The use case diagrams are shown below.



For the Teacher user case diagram:

Actors: Teacher

- Teacher can import students' information for a course.
- Teacher can generate students' basic information (including usernames and passwords).
- Teacher can add the submission items of a course.
- Teacher can form teams for a course.
- Teacher can export a file which lists the contribution.

For the Student user case diagram:

Actors: Student (including Project leader and Project member)

- Student can login the system.

- Student can change the password, send a pairing invitation, accept a pairing invitation and vote for the team leader.
- Project leader can assess members' contribution.
- Project member can give an assessment to the leader.

## **2.3 User Classes and Characteristics**

There are two kinds of user classes. One class is teachers and the other class is students. Teachers and students are both members in the same university and they need to use this system to finish their work with higher quality and efficiency. Additionally, they all have some basic knowledge about computer and Internet. For example, they know how to use browser in Windows, Mac or Linux desktop to open and use our web application.

## **2.4 Operating Environment**

The application is based on web browser. The application is able to run on Linux-based operating system or Microsoft Windows.

## **2.5 Design and Implementation Constraints**

Language requirements: Web application uses English as the language of the user interface. Other constraints are TBD.

## **2.6 User Documentation**

An independent user manual is needed to provide for users. This manual should be written in English version. The user manual will also be placed on the application's web page for user to read online.

## **2.7 Assumptions and Dependencies**

Users should have a device that can connect to the Internet and use a browser.

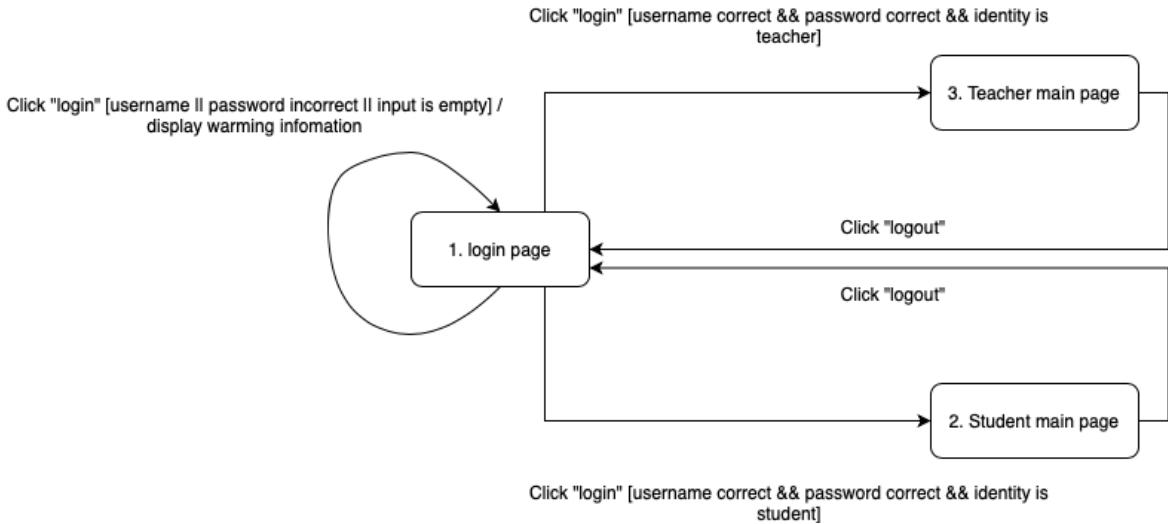
# **3. System Features**

## **3.1 Login & Logout**

### **3.1.1 Description and Priority**

Users can use this feature to login to the system with corresponding role. This is the highest priority feature in the system because only if the user has logged in, can he/she use other features in the system. User can also logout whenever he/she wants. After logging out, he/she cannot access to the functions of the system until they re-login.

### **3.1.2 Stimulus/Response Sequences**



### 3.1.3 Functional Requirements

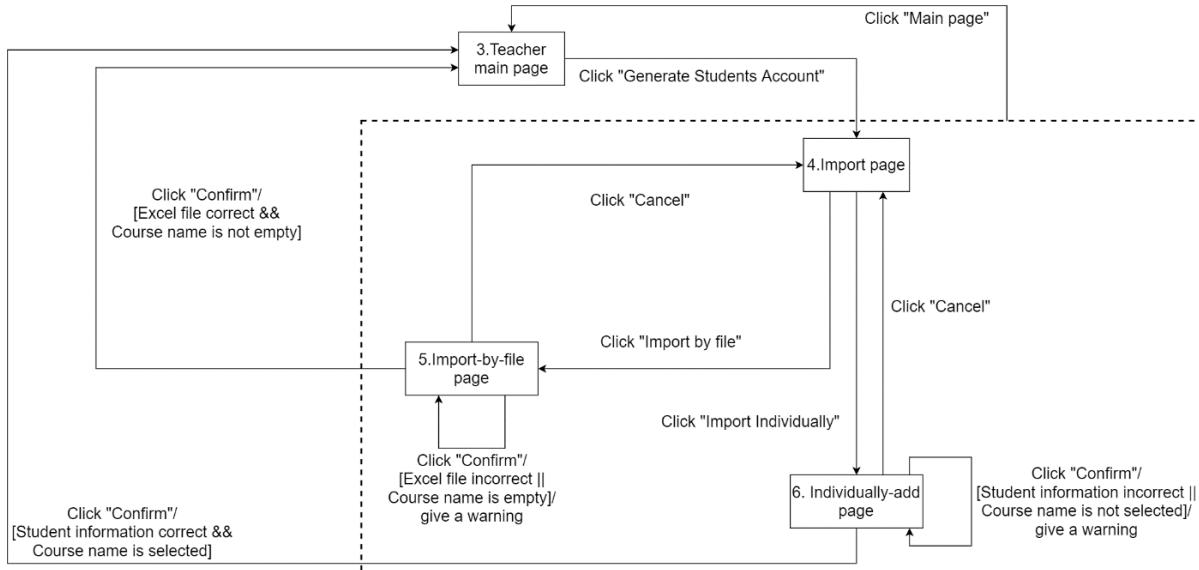
- REQ-1: The student's username is according to the student e-mail and cannot be changed.
- REQ-2: The student initial passwords are all the same when they are generated. Students can change the initial password after their login. There is no special requirement for the password.
- REQ-3: If any of the user's input is empty, the system will ask the user to complete the form.
- REQ-4: If what user inputs does not match in the database, the system will display the warming information and ask the user to retry.

## 3.2 Import students' info and generate students' accounts

### 3.2.1 Description and Priority

Teachers can import students' information for a course into the system by an excel file and generate username and initial password for each student whose name is in the students' information. The excel file should follow the provided format or the system will give warning. Also, for those students enrolled into the class later, the student accounts can be generated individually. This is a high priority feature in the system.

### 3.2.2 Stimulus/Response Sequences



### 3.2.3 Functional Requirements

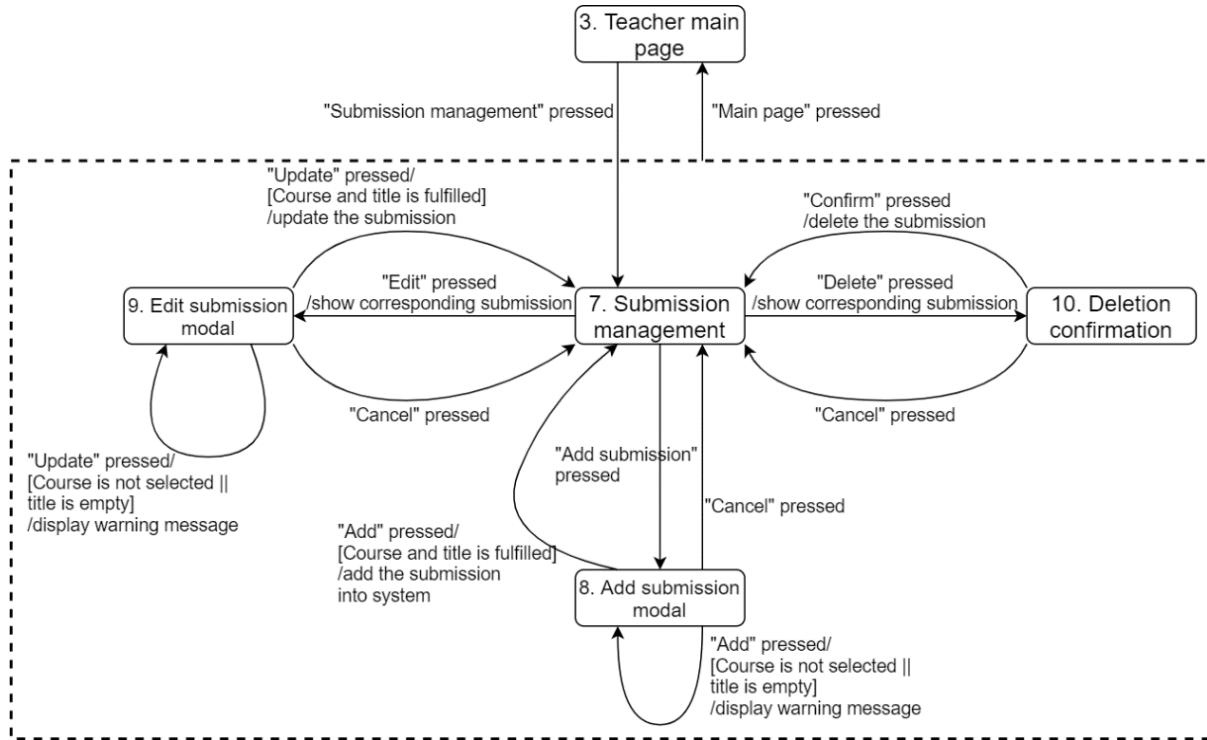
- REQ-1: The system will check whether the excel file uploaded is empty or not. If empty, it will ask the user to retry.
- REQ-2: The system will check whether the file is uploaded successfully, if not, it will give the warning
- REQ-3: The system will check whether the content in excel file follows the format provided (name, id, email, GPA (optional)). If the request is not met, the system will reject the submission.
- REQ-4: The system will check whether teacher has input all the needed information of the student for individual student account generation. If not, it will give the warning and ask user to retry.
- REQ-5: The system will check whether all the information of the student input for individual student account generation is valid or not. If not, it will give the warning and ask user to retry.
- REQ-6: During student accounts generation, the system will check whether a student imported is existed in the system. If so, then no new account is generated in case of duplication.

## 3.3 Edit submission item

### 3.3.1 Description and Priority

The user can add, delete, modify the submission item in the system. This is a high priority feature in the system.

### 3.3.2 Stimulus/Response Sequences



### 3.3.3 Functional Requirements

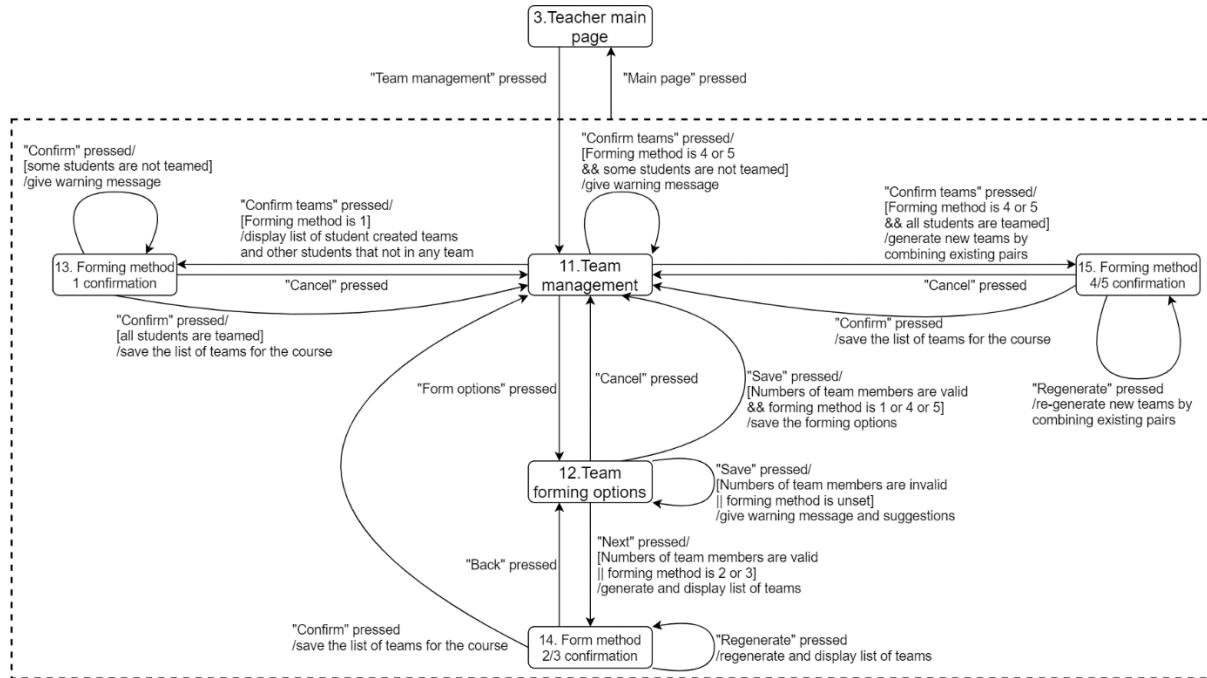
- REQ-1: There are 3 attributes of the submission: belonging course, title and assessment percentage.
- REQ-2: The belonging course of a submission should be selected in the existing courses of the teacher.
- REQ-3: The system will check whether the belonging course is unset, the title is empty, or the assessment percentage is empty, for a submission. If it is, the system will warn the teacher before adding or modifying a submission.
- REQ-4: The total percentage of submissions in the same course should be 100%. The system will notice the teacher but will not validate it. This constraint will be validated in other system features.

## 3.4 Form teams for a course

### 3.4.1 Description and Priority

The teacher can form teams of students for a course. There are 5 different methods to form teams. This is a high priority feature in the system.

### 3.4.2 Stimulus/Response Sequences



### 3.4.3 Functional Requirements

REQ-1: There are 5 team forming methods in the system:

1. Form all the teams created by the students themselves
2. Form all the teams randomly by the system automatically
3. Form all the teams with “team GPA optimization” by the system automatically
4. Form all the teams by combining pairs of students randomly by the system automatically
5. Form all the teams by combining pairs of students with “team GPA optimization” by the system automatically

Among all the methods, method 1 and 2 have “high” priority, method 3 and 4 have “middle” priority, and method 5 has “low” priority.

REQ-2: For forming method 1, 2 and 3, a valid pair of “primary number of team members” and “secondary number of team members” should be specified by the teacher.

To validate the two numbers, the system will use the following formula of the number of all students in the course ( $n$ ), the “primary number of team members ( $n_1$ )” and the “secondary number of team members ( $n_2$ ):

$$n = n_1 * x + n_2 * y$$

If there is no pair of natural numbers  $x$  and  $y$  that satisfy the formula, the system will give a warning message for the teacher to correct.

REQ-3: For forming method 4 and 5, “primary number of team members” must be multiple of 2 and factor of number of course students, or the system will give a warning message.

REQ-4: In “Team forming options” page, after the teacher input the “primary number of team members”, the system will suggest a valid value for the “secondary number of team members” and fill it into the input box automatically. If the system fails to give out suggestion value, a warning

message will be displayed under the “secondary number of team members” input box.

- REQ-5: For forming method 1, 4 and 5, the teacher should let the students create their own teams first before generating list of teams. The system will try to generate list of teams from the teams created by the students or give warning message if the system fails to do so.
- REQ-6: When the teacher chooses forming methods with “team GPA optimization”, a floating band (named it  $\alpha$ ) with 0 as default value should be specified. The system will compute the average GPA of all students in the course (named it  $\mu_{\text{all}}$ ), then try to satisfy the following formula of  $\alpha$ ,  $\mu_{\text{all}}$  and the average GPA of the team (named it  $\mu_{\text{team}}$ ) on every new team during forming new teams.

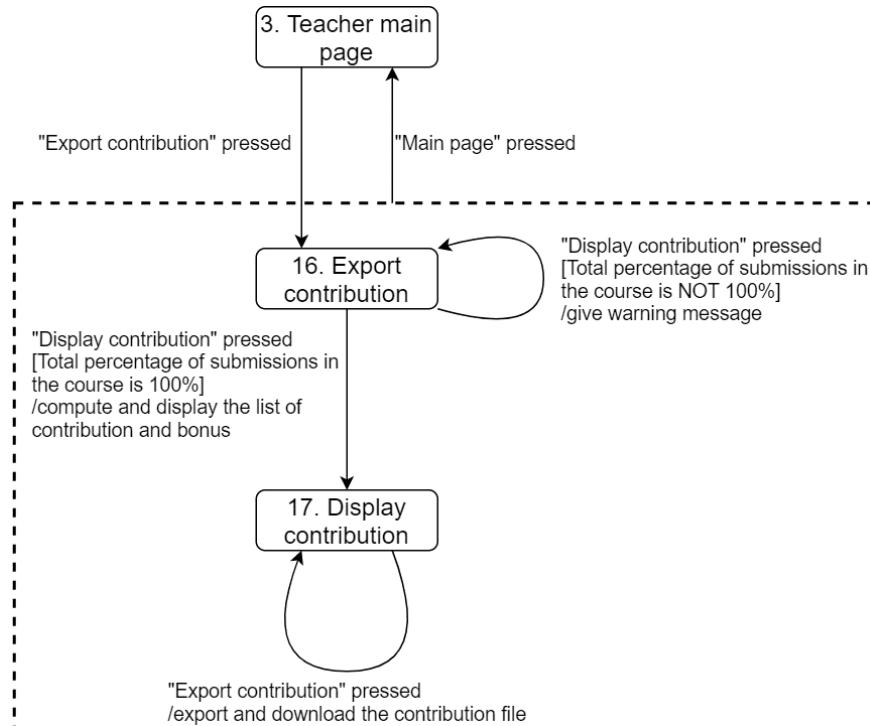
$$\mu_{\text{all}} - \alpha \leq \mu_{\text{team}} \leq \mu_{\text{all}} + \alpha$$

## 3.5 Export contribution file for a course

### 3.5.1 Description and Priority

The teacher can export the contribution file for every student in a course. This is a high priority feature in the system.

### 3.5.2 Stimulus/Response Sequences



### 3.5.3 Functional Requirements

- REQ-1: The teacher should export the contribution after confirming the team formation of the course, or the system will give an error message otherwise.

REQ-2: The system will compute the contribution of each student using following formulas:

- For non-leader members:

$$\text{Overall Contribution} = \sum_{i=1}^n P_i * C_i$$

Where  $P_i$  is the assessment percentage for submission  $i$ ,  $C_i$  is the contribution of a student in submission  $i$  and  $n$  is the total number of submissions.

- For team leaders: add a bonus point, which is the average of the overall assessment points from the other team members.

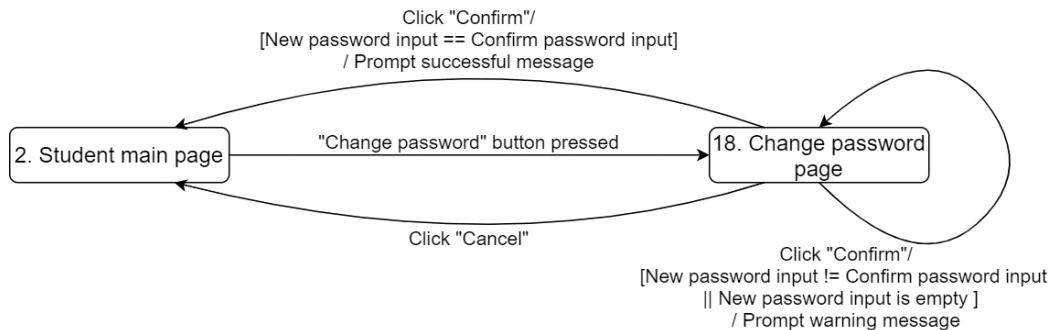
REQ-3: The exported file has the following columns: name, ID, contribution, bonus.

## 3.6 Student update password

### 3.6.1 Description and Priority

After the student login the system, he/she can change his/her password. This is a middle priority feature in the system.

### 3.6.2 Stimulus/Response Sequences



### 3.6.3 Functional Requirements

REQ-1: There is no special requirement for the password.

REQ-2: If any of the user's input is empty, the system will ask the user to complete the form.

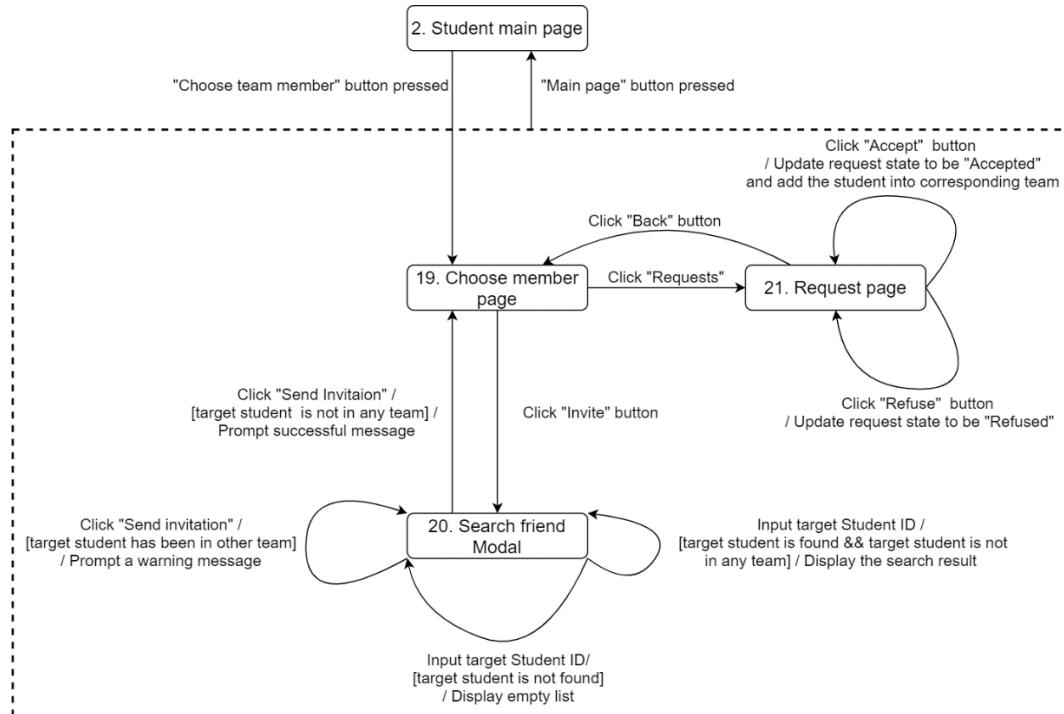
REQ-3: If the new password user input to change is not the same as what he/she input to confirm, the system will give the warning and ask user to retry.

## 3.7 Student chooses team member

### 3.7.1 Description and Priority

Students can invite others to form a team and respond the requests from their friends who choose them as team members. This is a high priority feature in the system.

### 3.7.2 Stimulus/Response Sequences



### 3.7.3 Functional Requirements

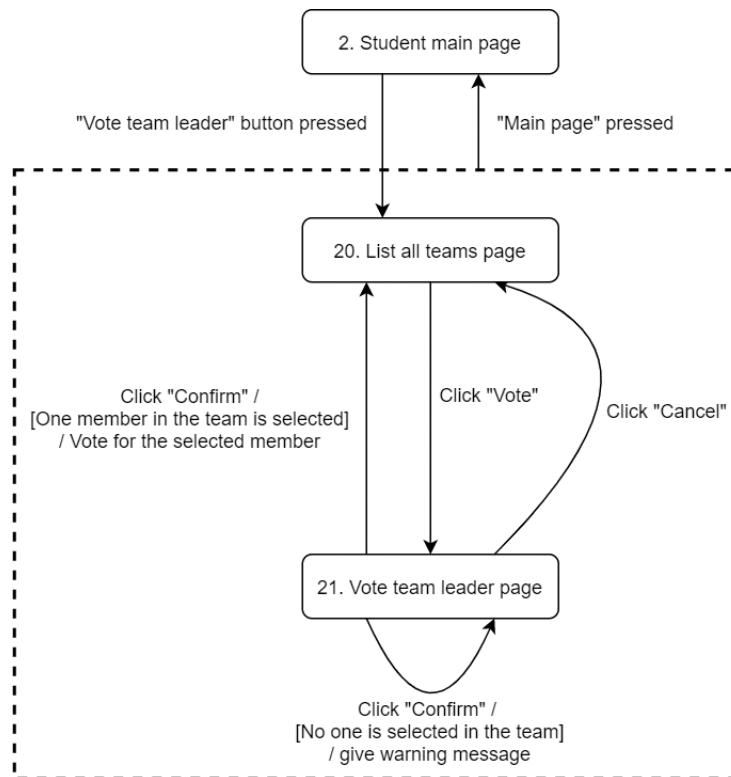
- REQ-1: If the team formation method is 1, 4 and 5 (method 1 is “all the members are chosen by students themselves”; method 4 and 5 are “a student can choose one friend and others are given by system randomly”), then this feature is enabled.
- REQ-2: Whether the student can withdraw the team member invitation is TBD
- REQ-3: In the Search friend modal, when the student information is matched, then he/she will be displayed in the list
- REQ-4: If the student invited has been enrolled in a team, the system will give a warning and ask user to retry.
- REQ-5: Student can view the formation requests sent by the others in the “Request” page and choose to accept or reject.

## 3.8 Students vote their team leader

### 3.8.1 Description and Priority

The student should vote to choose the project leader of the team. This is a high priority feature in the system.

### 3.8.2 Stimulus/Response Sequences



### 3.8.3 Functional Requirements

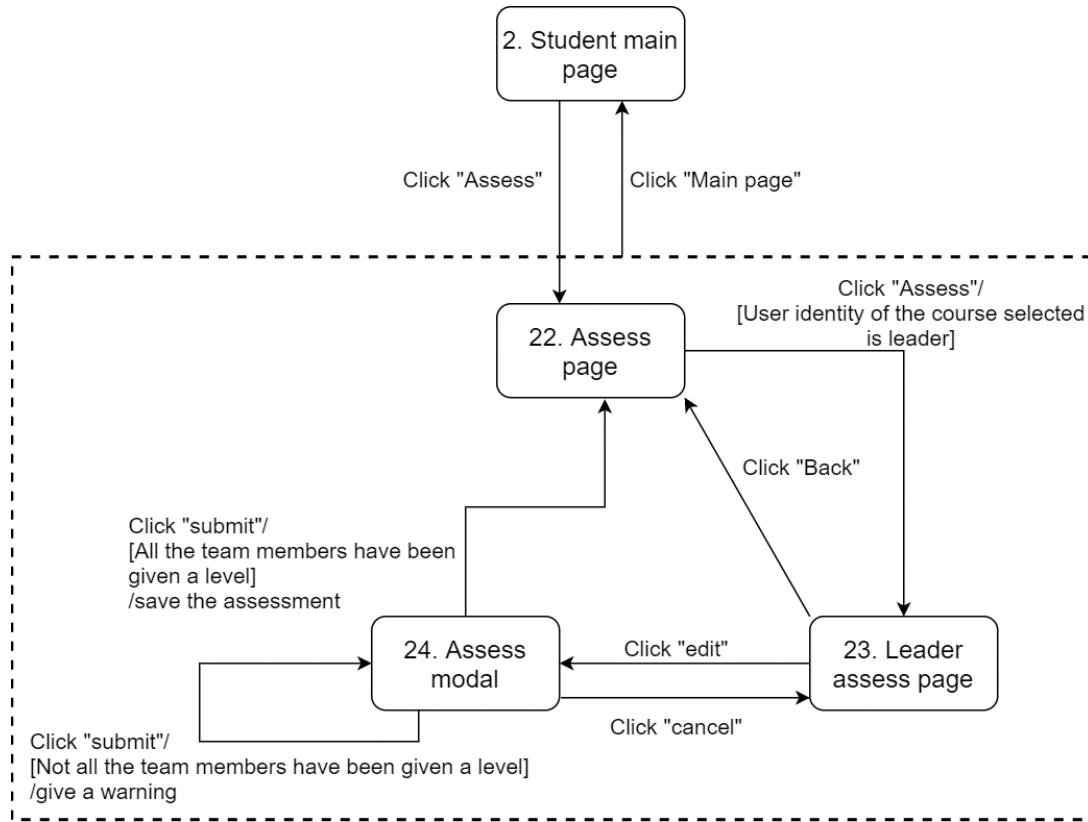
- REQ-1: Whether the leader is determined before or after the confirmation from the teacher is TBD.
- REQ-2: Only if the team leader is not decided in a team, the "Vote team leader" button is shown on the right side of the course name.
- REQ-3: Whether a student can withdraw his/her vote is TBD.

## 3.9 Leader assesses members' contribution

### 3.9.1 Description and Priority

The project leader can assess each member's contribution in each submission if he likes. This is a high priority feature in the system.

### 3.9.2 Stimulus/Response Sequences



### 3.9.3 Functional Requirements

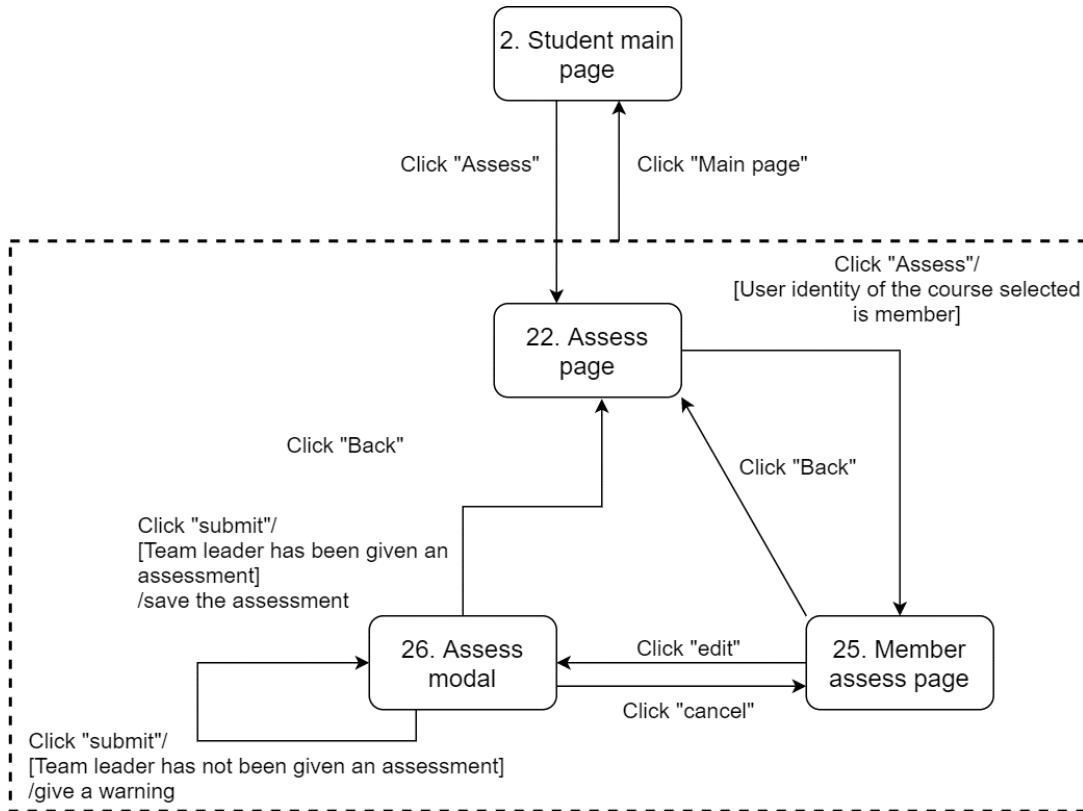
- REQ-1: Whether the leader can update the assessment submitted is TBD.
- REQ-2: If the leader does not make any assessment to the submission, the default level for each member is "full".
- REQ-3: In Assess page, all the courses where the student enrolled are displayed to be selected. If the identity in the selected course is leader, the system will automatically route to leader assess page.
- REQ-4: The contribution is classified in four level: (a) full (1.0), (b) fair (0.67), (c) little (0.33), (d) none (0).
- REQ-5: The final contribution of every student will be computed during System Feature 3.5 "Export contribution file".

## 3.10 Member assesses leader's contribution

### 3.10.1 Description and Priority

The team members have the right to give OVERALL assessment on the project leader after the project is finished. This is a high priority feature in the system.

### 3.10.2 Stimulus/Response Sequences

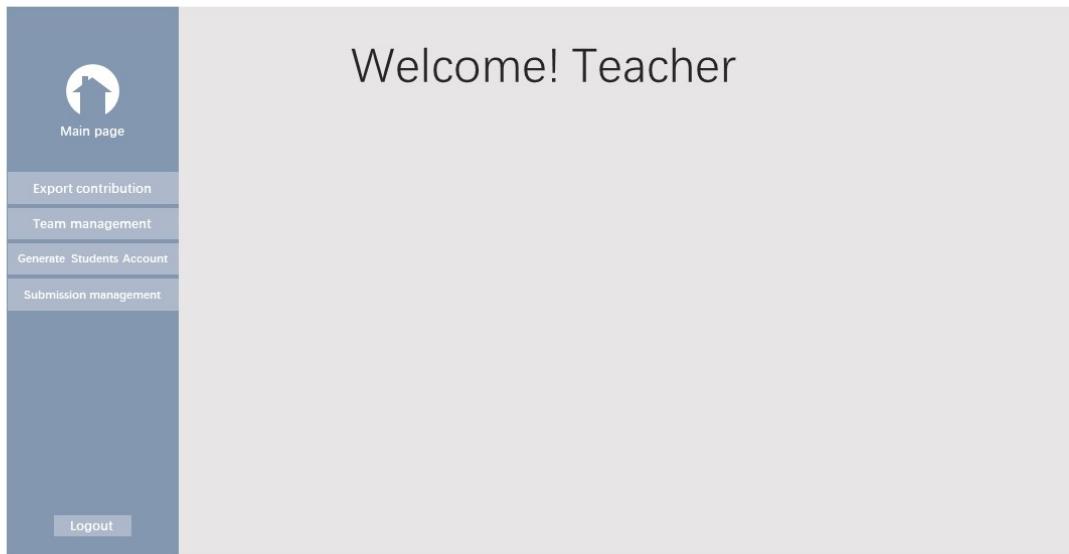


### 3.10.3 Functional Requirements

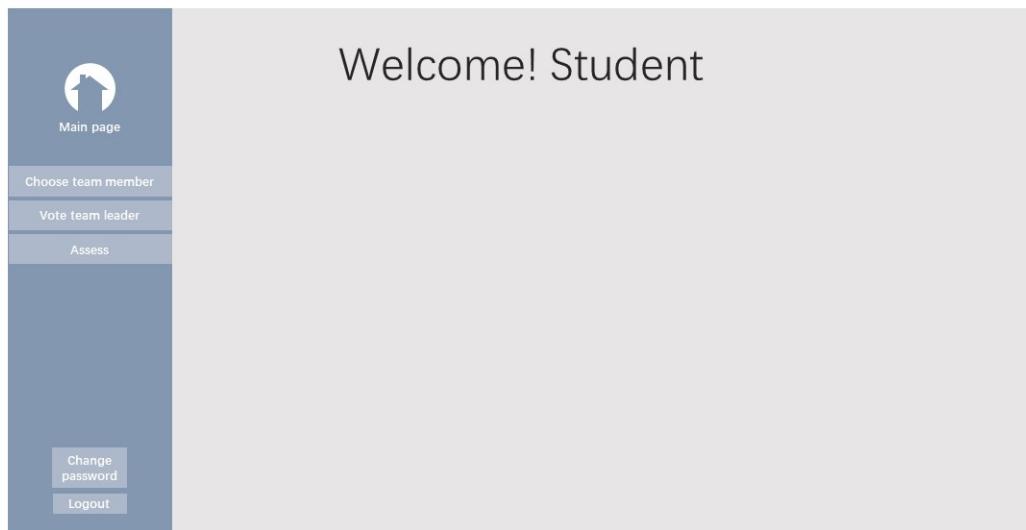
- REQ-1: Whether the team member can update the assessment of the leader is TBD.
- REQ-2: If the member does not make any assessment to the leader, the default level for the leader is "fair".
- REQ-3: In Assess page, all the courses where the student enrolled are displayed to be selected. If the identity in the selected course is member, the system will automatically route to member assess page.
- REQ-4: There are 4 levels for the assessment of the leader: very good <2>, good <1>, fair <0>, bad <-1>, very bad <-2>.
- REQ-5: The final bonus of the leaders will be computed during System Feature 3.5 "Export contribution file".

## 4. External Interface Requirements

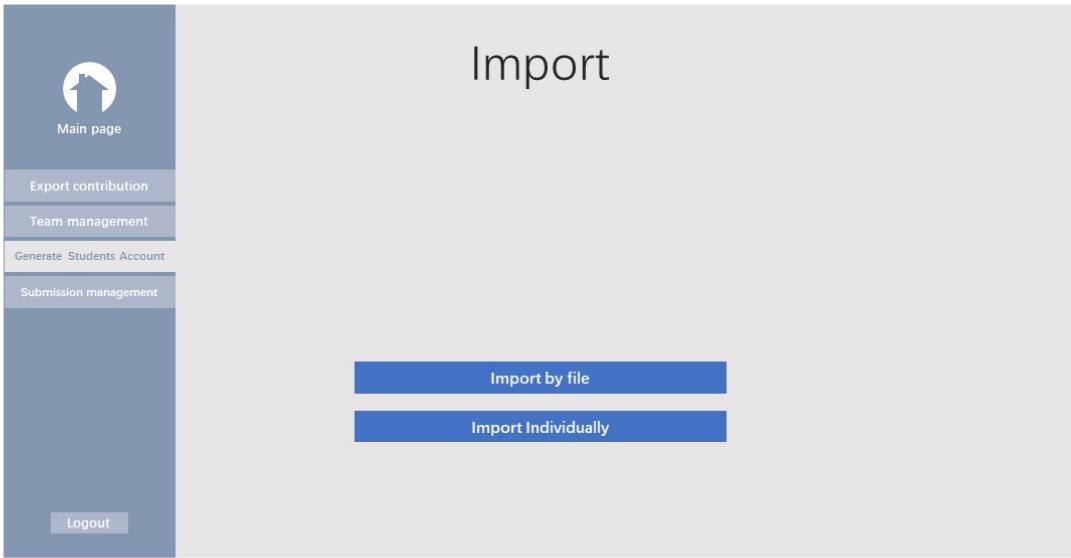
### 4.1 User Interfaces



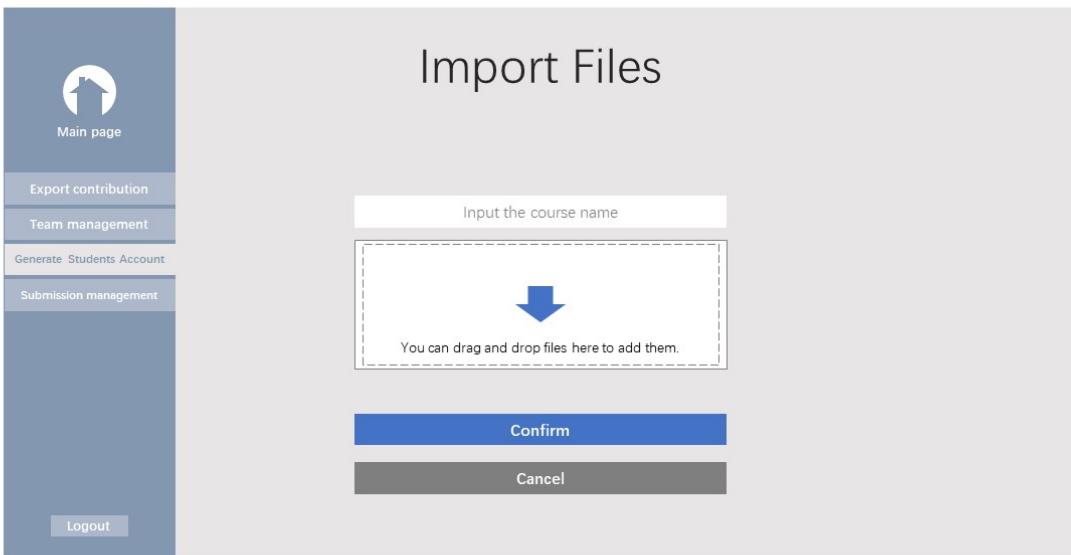
3. Teacher main page



2. Student main page



4. Import page



5. Import-by-file page

Main page

Export contribution

Team management

Generate Students Account

Submission management

Logout

## Import Information

Choose the course

Input student name

Input student ID

Input student E-mail

Input student GPA

**Confirm**

**Cancel**

6. Individually-add page

Main page

Export contribution

Team management

Generate Students Account

Submission management

Logout

## Manage Submissions

Title	Course	Search		
A	x%	1	Edit	Delete
B	x%	2	Edit	Delete
C	x%	3	Edit	Delete
D	x%	4	Edit	Delete
E	x%	5	Edit	Delete
F	x%	6	Edit	Delete
G	x%	7	Edit	Delete

**Add Submission**

7. Submission management page

Main page

Export contribution

Team management

Generate Students Account

Submission management

Logout

## Add New Submission

Please input the title

Please input the percentage

Choose the course

Add

Cancel

8. Add submission page

Main page

Export contribution

Team management

Generate Students Account

Submission management

Logout

## Edit Submission

Please input the new title

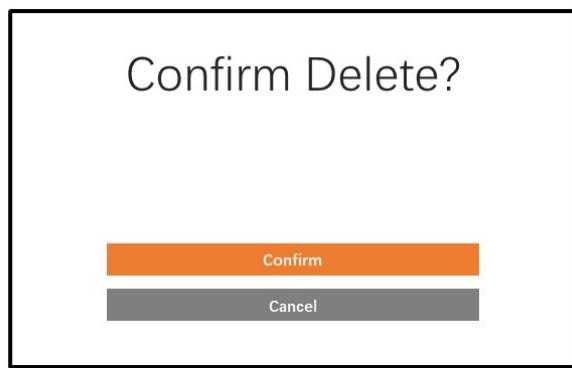
Please input the new percentage

Choose the new course

Update

Cancel

9. Edit submission page



10. Deletion Confirmation

The screenshot shows a user interface for managing teams. On the left is a vertical sidebar with a house icon and the following menu items: Main page, Export contribution, Team management, Generate Students Account (which is highlighted in blue), and Submission management. At the bottom of the sidebar is a Logout button. The main content area has a title 'Manage Teams'. Below the title is a table with two columns: 'Course' and 'Team number'. The table contains seven rows, each with a course letter and its corresponding team number. To the right of each row are two buttons: 'Confirm teams' (green) and 'Form options' (orange).

Course	Team number		
A	10	Confirm teams	Form options
B	10	Confirm teams	Form options
C	10	Confirm teams	Form options
D	10	Confirm teams	Form options
E	10	Confirm teams	Form options
F	9	Confirm teams	Form options
G	8	Confirm teams	Form options

11. Team management page

The screenshot shows a user interface for forming teams. On the left is a vertical sidebar with a house icon and the following menu items: Main page, Export contribution, Team management, Generate Students Account (which is highlighted in blue), and Submission management. At the bottom of the sidebar is a Logout button. The main content area has a title 'Form Teams'. It includes a dropdown menu labeled 'Choose the forming method'. Below the dropdown are three input fields: 'Input primary number of team members', 'Input secondary number of team members', and 'Input the floating bands around the average GPA'. At the bottom are two buttons: a green 'Save' button and a grey 'Cancel' button.

12. Team forming options page

Main page

Export contribution

Team management

Generate Students Account

Submission management

Logout

Cancel

Confirm

Team	Member number
D	4
E	4
F	5
G	4

Name	ID
JJ	11110
KK	11111
LL	11112

13. Forming method 1 confirmation

Main page

Export contribution

Team management

Generate Students Account

Submission management

Logout

Cancel

Regenerate

Confirm

Team	Member number
D	4
E	4
F	5
G	4

14. Forming method 2/3 confirmation

The screenshot shows a modal dialog box titled "Confirm The Forming?". On the left is a sidebar with navigation links: Main page, Export contribution, Team management, Generate Students Account, Submission management, and Logout. The "Submission management" link is highlighted. The main content area displays a table with two columns: "Team" and "Member number". The table contains four rows: D (4), E (4), F (5), and G (4). At the bottom of the dialog are three buttons: Cancel (orange), Regenerate (green), and Confirm (blue).

Team	Member number
D	4
E	4
F	5
G	4

15. Forming method 4/5 confirmation

The screenshot shows the "Course Contribution" page. On the left is a sidebar with the same navigation links as the previous screenshot: Main page, Export contribution, Team management, Generate Students Account, Submission management, and Logout. The "Submission management" link is highlighted. The main content area features a dropdown menu labeled "Choose the course" and a blue button labeled "Display contribution".

16. Export contribution page

The screenshot shows a user interface for managing student contributions. On the left, a sidebar menu includes 'Main page' (with a house icon), 'Export contribution', 'Team management', 'Generate Students Account', 'Submission management', 'Logout', and 'Back to main page'. The main content area is titled 'Contribution' and displays a table with four columns: Name, ID, Contribution, and Bonus. The data in the table is as follows:

Name	ID	Contribution	Bonus
A	1	x%	0
B	2	x%	10
C	3	x%	15

At the bottom right of the main area is a blue button labeled 'Export contribution'.

17. Display contribution page

The screenshot shows a user interface for changing a password. On the left, a sidebar menu includes 'Main page' (with a house icon), 'Choose team member', 'Vote team leader', 'Assess', 'Change password', and 'Logout'. The main content area is titled 'Get New Password' and contains two input fields: 'New password' and 'Confirm password', both currently empty. Below these fields are two buttons: a blue 'Confirm' button and a grey 'Cancel' button.

18. Change password page



19. Choose member page



20. Search friend Modal

Request from	Course		
A	a	Accept	Refuse
B	b	Accept	Refuse
C	c	Accept	Refuse
D	d	Accept	Refuse
E	e	Accept	Refuse
F	f	Accept	Refuse
G	g	Accept	Refuse

21. Request page

Team name	
A	Vote
B	Vote
C	Vote

22. List all team page

Name	
A	<input type="checkbox"/>
B	<input type="checkbox"/>
C	<input type="checkbox"/>
D	<input type="checkbox"/>

Cancel      Confirm

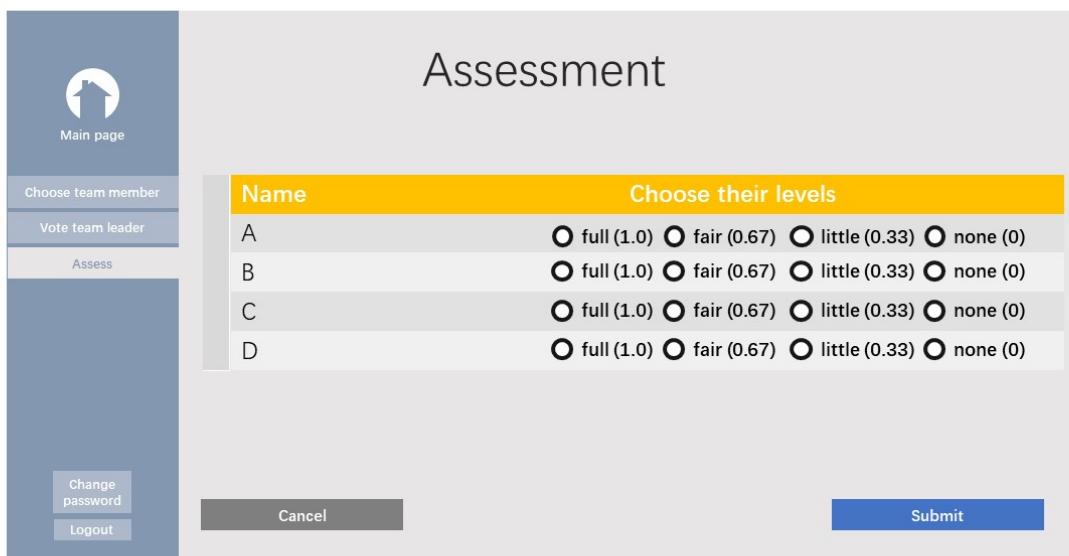
23. Vote team leader page

Course	
A	Assess
B	Assess
C	Assess
D	Assess
E	Assess
F	Assess
G	Assess

24. Assess page



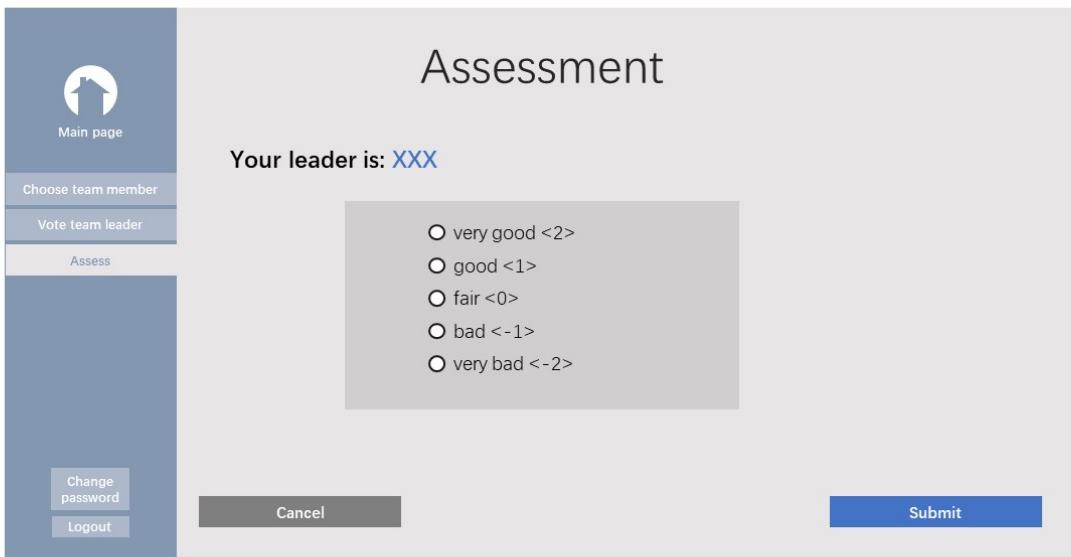
25. Leader assess page



26. Access modal



27. Member assess page



28. Access modal

## **4.2 Hardware Interfaces**

The software does not have the ability of controlling the hardware.

## **4.3 Software Interfaces**

- **Database**

The software needs MySQL-like database (we recommend MariaDB) to store all the information. Typically, the software queries the database to display the information (account information, courses, assignments, assessment, etc.) on the user interface; all the users can operate the user interface (web pages) to perform database-level operations, such as database addition, deletion, queries and modification.

- **Web server**

A web server, Nginx, is needed to proxy all the information between users and the backend of the software. Typically, when users send requests to Nginx, Nginx directs the requests to the correct interface of the backend; when the backend sends back responses according to the requests, Nginx directs the responses and sends them back to the corresponding users.

## **4.4 Communications Interfaces**

The software interacts with users on web browsers using HTTPS protocol. Modern web browsers (we recommend Google Chrome) are required.

# **5. Other Nonfunctional Requirements**

## **5.1 Performance Requirements**

The response time of each inquiry operation should be less than one second and other operation's response time should be less than two seconds.

## **5.2 Safety Requirements**

This system does not concern any safety issues.

## **5.3 Security Requirements**

The system will keep the privacy of the user safe. The teacher can only view and manage the data of students from his/her own class. The password protection is not provided in the system, so the user should carefully keep his/her password. Other security requirements are TBD.

## **5.4 Software Quality Attributes**

Maintainability: Some documents should be written to maintain the system in the future. There should be comments to help other developer to understand the system.

Usability: The GUI should be easy to learn and use by the user of any technical background. A

concise documentation should be provided to the administrator.

Portability: the website will ensure to support latest versions of the web browsers.

Security: The information should be available to user according to their identities.

Robustness: The system has a Mean time to Failures (MTTF) for 3000 hours per failure.

Reusability: some functions of the system could be reused on other websites, such as being part of iSpace.

## **6. Other Requirements**

TBD

## **Appendix A: Glossary**

- TBD: To be determined
- T.C.A.S.: Teamwork Contribution Assessment System
- MTTF: Mean time to Failures

## **Appendix B: Analysis Models**

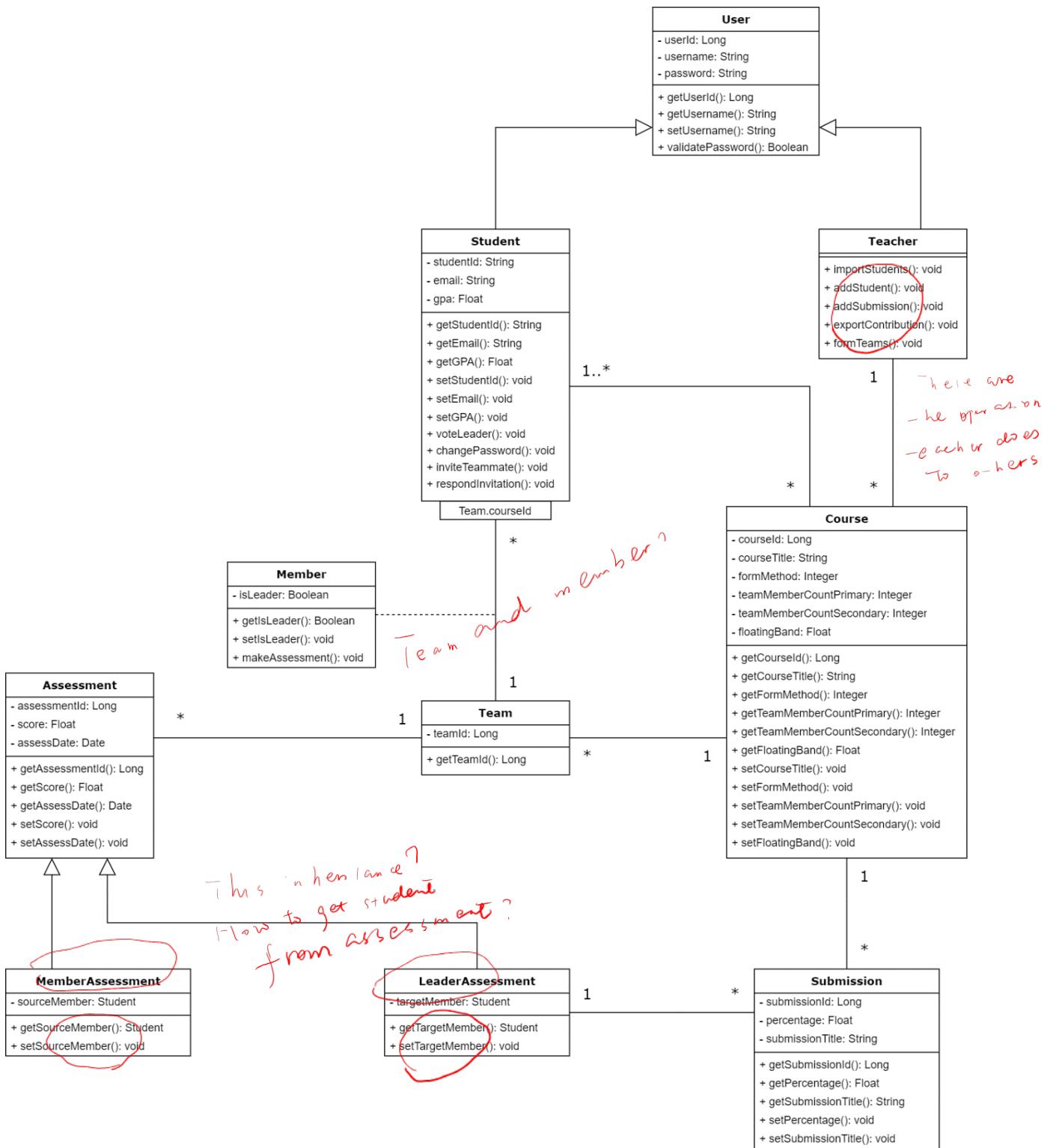


Figure 1 Class Diagram

where to see the contribution for each member in each item?

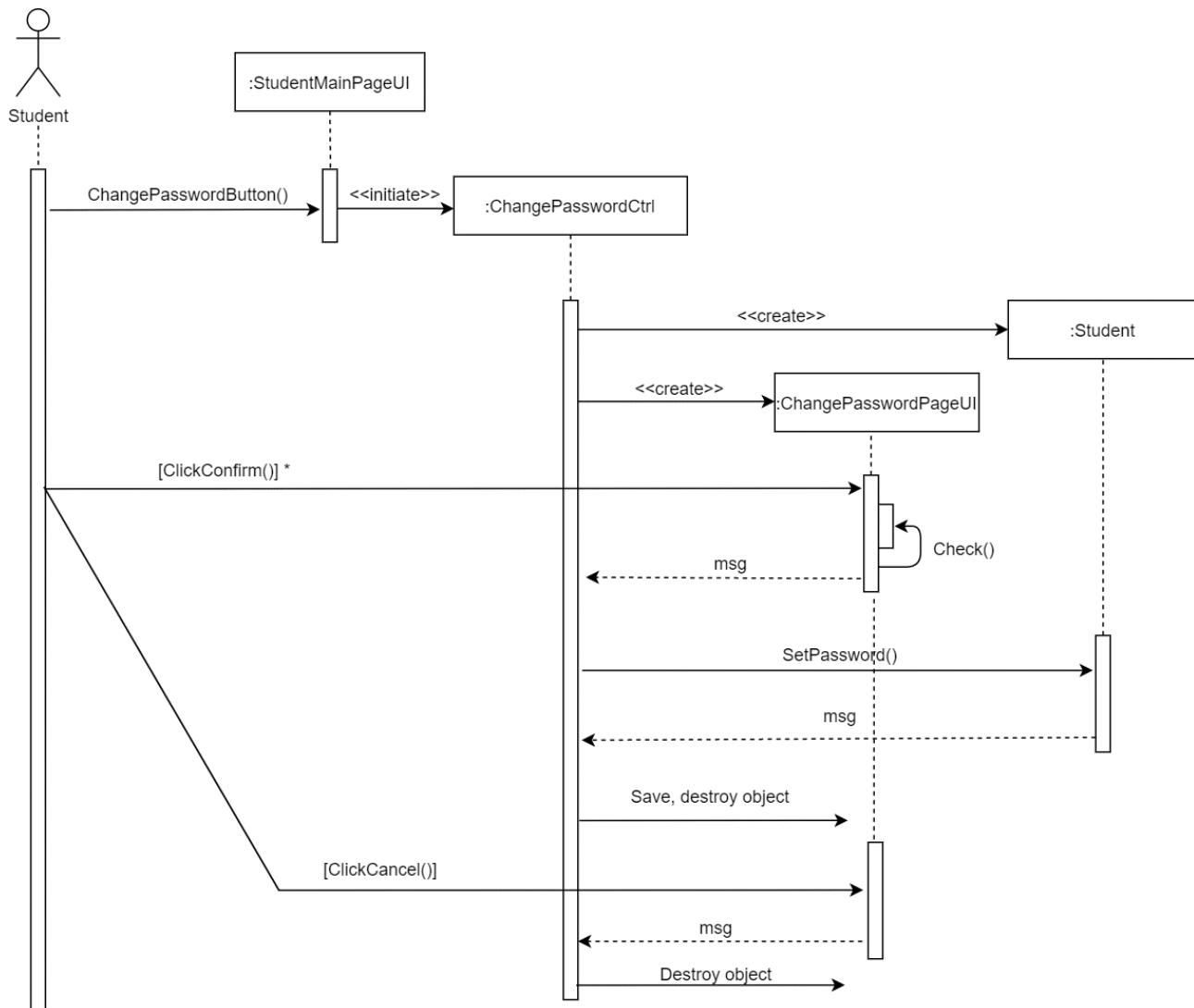


Figure 2 Sequence Diagram: System Feature 3.6 Student Update Password

## Appendix C: Issues List

TBD