

---

# Software Requirements and Specifications

---

ER Tutoring System

**The A-Team**



University of Massachusetts Amherst

---

## CONTENTS

---

<b>i</b>	<b>INTRODUCTION</b>	<b>6</b>
<b>1</b>	<b>PURPOSE OF SYSTEM</b>	<b>7</b>
<b>2</b>	<b>OVERVIEW</b>	<b>8</b>
<b>3</b>	<b>SCOPE</b>	<b>9</b>
<b>4</b>	<b>DEFINITIONS</b>	<b>10</b>
<b>ii</b>	<b>DIAGRAMS</b>	<b>12</b>
<b>5</b>	<b>DATA DICTIONARY</b>	<b>13</b>
<b>6</b>	<b>CONTEXT LEVEL DIAGRAM</b>	<b>14</b>
<b>7</b>	<b>LEVEL 0 DIAGRAM</b>	<b>15</b>
<b>iii</b>	<b>FUNCTIONAL REQUIREMENTS</b>	<b>16</b>
<b>8</b>	<b>FUNCTIONAL REQUIREMENTS</b>	<b>17</b>
8.1	Allow Student to Draw a Diagram	17
8.2	Submit Answer	18
8.3	Author logs in	19
8.4	Author creates new assignment	20
8.5	Author Removes Assignment	20

8.6	Author adds/removes students to the assignment	21
8.7	Author adds/removes question from the question bank to the assignment	22
8.8	Author views assignment	23
8.9	Author views Student reports	24
8.10	User registers for the Online Tutor System	26
8.11	Student Selects Question to Answer	27
8.12	Student Logs In	28
8.13	Student Views Assignments	29
8.14	Student Views Question	30
8.15	Author	31
8.16	Student Views Feedback	32
8.17	Author Logs In	33
8.18	Author Views the Question Bank	34
8.19	Author Adds a New Question to Question Bank	35
8.20	Author Edits a Question From the Question Bank	37
8.21	Author Removes a Question From the Question Bank	38
8.22	Author Views a Question	39

8.23	Author Copies a Question	40
<b>9</b>	<b>ENVIRONMENTAL REQUIREMENTS</b>	<b>41</b>
9.1	ToolBox for Drawing Diagram	41
9.2	Save Progress of Current Assignment	41
9.3	List of Available Questions and Their Status	42
9.4	Open Space to Draw Diagram	42
9.5	Compatibility With Multiple Browsers	42
<b>10</b>	<b>PERFORMANCE REQUIREMENTS</b>	<b>43</b>
10.1	Correctness Analysis	43
10.2	Question Loading	43
<b>11</b>	<b>SAFETY/SECURITY REQUIREMENTS</b>	<b>44</b>
11.1	User (Student/Instructor/Author) Correctly Logs into the Online Tutor System	44
11.2	User Incorrectly Logs into the Online Tutor System	45
11.3	User Correctly Logs out of the Online Tutor System	46
11.4	User Creates an Account on the Online Tutor System	46
11.5	User Has Limited Amount of Attempts to Log In	47

<b>12</b>	<b>ACCURACY REQUIREMENTS</b>	<b>49</b>
12.1	Student Submits Correct Answer Diagram	49
12.2	Student Submits Incorrect Answer Diagram	50
<b>13</b>	<b>PROFESSOR UI REQUIREMENTS</b>	<b>52</b>
13.1	Professor Clicks on Side or Top Navigation Buttons	52
13.2	Professor Clicks on the Assignment Submission Ticker	53
13.3	Professor Clicks on the Class or Student Ticker	53
13.4	Professor Clicks to Expand the Assignment Creation Sandbox	54
<b>iv</b>	<b>USE CASES</b>	<b>55</b>
<b>14</b>	<b>ROBUSTNESS USE CASES</b>	<b>56</b>
14.1	Online Tutor System Should Never Crash	56
14.2	UI Should React Correctly to User Actions	56
14.3	Student Submits Variant of Correct Answer Diagram	56
14.4	Author Must Completely Fill Out the Question Creation Form	58

<b>15</b>	<b>LOGIN/LOGOUT SYSTEM USE CASES</b>	<b>59</b>
15.1	Student or instructor correctly logs into the system	59
15.2	Student or instructor incorrectly logs into the system	60
15.3	Student or instructor correctly logs out of the system	61

## Part I

# INTRODUCTION

---

## PURPOSE OF SYSTEM

---

The purpose of this system is to be an online tutor for students learning ER diagrams. This learning tool would help teach the students and allow them to create ER diagrams and submit them as assignments. The assignments will be created by the instructor using questions taken from a question bank. The questions will have been created by an author and will include the correct answers and any necessary feedback. Once the student submits an answer to be graded they will be given feedback if incorrect. This helps the students learn from their mistakes. The benefits of this system is that it makes learning and submitting assignments much easier for both the students and instructor.



---

## OVERVIEW

---

This document will clearly outline the requirements and the system requirements of the ER Diagram Tutoring System. This document should cover all key concepts and fundamental requirements. The requirements should satisfy the standards of the client and provide accuracy in the functionality of the system.

---

## SCOPE

---

The ER Diagram Tutoring System will contain many features to help both students and instructors with the process of teaching. To use the system a user will have to log in. There will be three different types of users. An author can create, edit, copy, or remove questions from the question bank. They are also able to view any previously made question without changing it. An instructor can make assignments using questions taken from the question bank. These assignments are to be assigned to students in the class. They are also able to view their students and information about their attempts on the assignments. The students are the ones who are taking the class and who the questions are made for. They can view questions, without the answers shown, and need to answer and submit them.

---

## DEFINITIONS

---

- **Online Tutor System** the system that is created which is a web based platform, used to assign students questions and assignments and used by students to learn how to construct ER Diagrams
- **Student** the user that is accessing the online tutor system in order to learn and practice making ER Diagrams
- **Learning Tool** - the system which is used by the student to understand how to create ER Diagrams
- **Assignment** - the collection of questions that the instructor selects for the student to answer by a certain common date
- **Instructor** - the user who creates assignments by selecting questions from the question bank to be assigned to their students to answer
- **Feedback** - what is returned to students after they submit an answer. It can be composed of hints, suggestions and messages from the author

- **Author** - the user who creates the questions, answer, and feedback. They also upload them to the question bank for future use
- **Draw** - the action the student or author takes to insert shapes and words from the toolbox to the answer area of the UI, either to be submitted by the student, or while being created by the author
- **Question** - what is being asked of the student to create, part of an assignment
- **Toolbox** - the area of the UI that contains all of the shapes, lines and textboxes for the user to drag and drop onto the draw space
- **Answer** - the ER Diagram that is submitted to be graded
- **NetID/username** - the NetID is the username of the user needed to log into the system
- **Question bank** - database of all of the questions that have been created by an author that the instructors can select from to create assignments for the students
- **Draw space** - the area in which the answer to the question is drawn
- **Users** - the person using the system. There are three different types of users: Students, Instructors, and Authors

## Part II

# DIAGRAMS

---

## DATA DICTIONARY

---

Student Info	Instructor Info	Author Info	Retrieve Question
- student ID - password	- instructor ID - password	- author ID - password	- question ID - question - assignment ID
Submit Answer	Send Student Score	Send Feedback	Display Assignment Info
- student ID - question ID - student's answer	- student ID - instructor ID - student score	- question ID - feedback - assignment ID	- assignment ID - student ID
Display Feedback	Create New Questions/Answers/Feedback	Update Question	Add Student to Assignment
- student ID - student answer - question ID	- question ID - question info - correct answer - feedback	- question ID - question info - question feedback - question answer	- student ID - assignment ID
Create Assignment	Update Scores	Update Assignment	Retrieve Assignment
- name - assignment ID - students[]	- question ID - student answer	- instructor ID - students[] - assignment name - assignment ID	- Instructor ID - students[] - assignment name - assignment ID
Check Answers			
- question ID - student ID - student answer - question answer			

Table 1: Data Dictionary

---

## CONTEXT LEVEL DIAGRAM

---

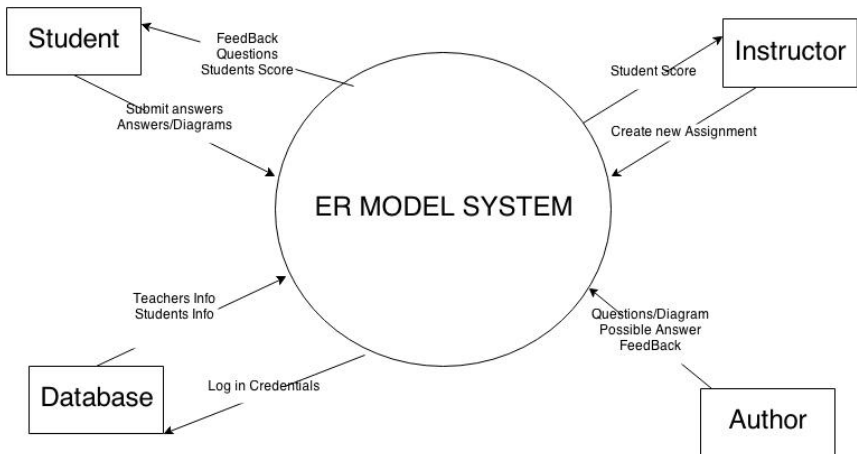


Figure 1: DFD Context Diagram

## LEVEL o DIAGRAM

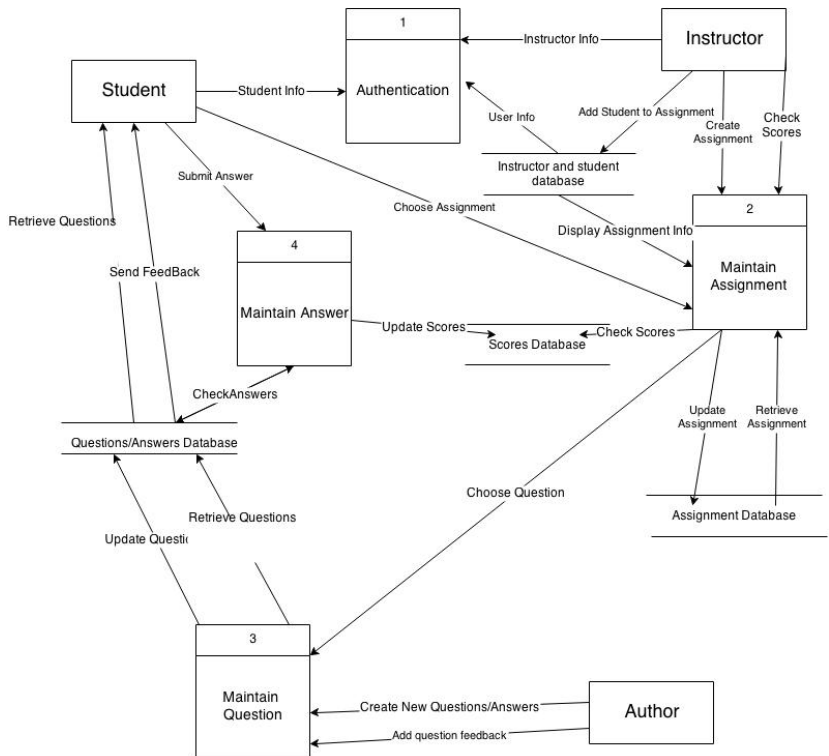


Figure 2: DFD Level o Diagram



## Part III

# FUNCTIONAL REQUIREMENTS

---

## FUNCTIONAL REQUIREMENTS

---

### 8.1 ALLOW STUDENT TO DRAW A DIAGRAM

Description: Student given tools and space to draw an ER diagram

Primary Actor: Student

Precondition: Student is logged in and viewing a question

Trigger: Student chooses a question to work on

Success end condition: Student can submit answer

Failed end condition: Diagram is not drawn

Steps:

1. Empty space available to draw diagram
2. Student picks a diagram type (Chen's/Crow's Foot)
3. Student picks shapes from toolbox and places in diagram
4. Student places text inside shapes
5. Student places links between shapes
6. Student can edit or remove anything already placed on the diagram before finalizing

Exceptions:

- Author draws diagram that students must edit  
\*Draw space will not be empty, student will be able to make changes to present diagram

## 8.2 SUBMIT ANSWER

Description: Student submits answer to be checked and saved by the system

Primary Actor: Student

Precondition: Student is ready to submit answer

Trigger: Pressing the submit button

Success end condition: Feedback and/or grade is given

Failed end condition: Nothing is given back to student

Steps:

1. Student submits answer by pressing the submit button
2. System processes answer and decides validity
3. Outputs feedback and/or grade for student to see
4. Answer is saved into database

Exceptions:

- Student leaves area blank  
\*Answer is just marked as wrong
- Author never properly input the correct answer or feedback  
\*Student is told that there's nothing to report

### 8.3 AUTHOR LOGS IN

Description: The Author is logging in, in order to access the Online Tutor System, using his/her NetID and password.

Primary Actor: Author

Precondition: The Author is on the login page of the system.

Trigger: The Author wants to log into the Online Tutor System.

Successful End Condition: The Author successfully logs into the Online Tutor System.

Failed End Condition: The Author is unable to log into the Online Tutor System.

Steps:

1. The Author enters his/her NetID in the username textfield.
2. The Author enters his/her password in the password textfield.
3. The Author clicks on the "login" button to enter the system.

Exceptions:

- The Author enters an incorrect NetID. In this case a message will be displayed that notifies that the NetID is incorrect.
- The Author enters an incorrect password. In this case a message will be displayed that notifies that the password is incorrect.

## 8.4 AUTHOR CREATES NEW ASSIGNMENT

Description: Author creates new assignment for students to be completed

Primary Actor: Author

Precondition: Author is logged in into tutoring system

Trigger: Author clicks on the create an assignment link

Successful End Condition(s): Assignment is added to the database and students are able to see it

Failed End Condition: No new assignment added

Steps:

1. Author clicks on the Create new assignment button on his homepage.
2. Author chooses the class assignment is made for.
3. Author names the assignment
4. Author picks a deadline for the assignment.
5. Author clicks submit button .
6. Assignment is added to database

Exceptions:

- An assignment with same name already exists.

## 8.5 AUTHOR REMOVES ASSIGNMENT

The Author will be removing an assignment from the assignment list.

Primary Actor: Author

Precondition: There must be at least one assignment in the

database.

Trigger: Author selects to remove an assignment

Success end condition: The author has successfully deleted an assignment

Failed end condition: The assignment list still shows the assignment that was supposed to be delete

Steps:

1. Author logs into system.
2. Author selects remove assignment(s).
3. The Author now has a list of assignments from which they can choose from.
4. The Author selects one or more assignments to delete.
5. Select delete assignment(s) and then the select assignments are deleted.

Exceptions:

- Assignment was already deleted by another Author.

## 8.6 AUTHOR ADDS/REMOVES STUDENTS TO THE ASSIGNMENT

Description: Author adds and removes student who can view and complete a particular assignment

Primary Actors: Author, Student

Precondition: Author is logged into the system

Trigger: Author clicks on "add/remove students" button in the particular assignment

Successful End Condition: Added students are able to see

a particular assignment, while removed students can no longer see it

Failed End Condition: Added student cannot see the assignment/removed students can see the assignment

Steps:

1. Author chooses assignment he wants to add/remove students to from the list of already created assignments.
2. Author clicks on "add/remove students" button.
3. Author is given an option to choose an already existing list of students.
4. Author can then choose individual students from student database.
5. Author then can remove any students from the list of students who have been added to the assignment.
6. Author then click on submit button.
7. List of students is updated in the database.

Exceptions:

- Student is not found in the database.

## 8.7 AUTHOR ADDS/REMOVES QUESTION FROM THE QUESTION BANK TO THE ASSIGNMENT

Description: Author adds and removes questions for an already created assignment

Primary Actor: Author

Precondition: Author is logged in

Trigger: Author clicks on "add/remove question" button in the particular assignment

Successful End Condition: Question is added/removed from list of question for a particular assignment

Failed End Condition: Question that was added/removed is still in the list of questions for the assignment

Steps:

1. Author chooses assignment he wants to add/remove questions to from the list of already created assignments.
2. Author clicks on "add/remove questions" button.
3. Author can search the bank of questions that has been created by a type/topic of question.
4. Author adds question he likes to the assignment.
5. Author can remove any question he previously chosen from the list of questions.
6. Author then click on submit button.
7. List of question for that assignment is updated in the database.

Exceptions:

- None.

## 8.8 AUTHOR VIEWS ASSIGNMENT

The Author will be viewing any assignment from the assignment list



Primary Actor: Author

Precondition: Author is logged into the system

Trigger: Author selects to view an assignment

Successful End Condition: Assignment is retrieved from database and can be viewed by Author

Failed End Condition: Assignment failed to load

Steps:

1. Author selects view assignment.
2. Author now has a list of assignments from which they can choose from.
3. Author selects an assignment.
4. Page will appear allowing the Author to view the assignment/questions.

Exceptions:

- None.

## 8.9 AUTHOR VIEWS STUDENT REPORTS

The Author wants to view any student's report for any assignment that the student attempted.

Primary Actor: Author

Precondition: Student has attempted the assigned questions

Trigger: Author attempts to view students stats

Successful End Condition: Students scores are retrieved and displayed on the report page

Failed End Condition: Student report failed to load

Steps:

- Exceptions:

- |        |                                      |                               |                       |
|--------|--------------------------------------|-------------------------------|-----------------------|
| Home   | <b>Student Report: Assignment ID</b> |                               |                       |
|        | <b>Student Name:</b>                 | <b>Number of Submissions:</b> | <b>Current Score:</b> |
|        |                                      |                               |                       |
|        |                                      |                               |                       |
|        |                                      |                               |                       |
|        |                                      |                               |                       |
|        |                                      |                               |                       |
|        |                                      |                               |                       |
|        |                                      |                               |                       |
|        |                                      |                               |                       |
| Logout |                                      |                               |                       |

25

## 8.10 USER REGISTERS FOR THE ONLINE TUTOR SYSTEM

Description: An Author or a student registers for the On-line Tutor System.

Primary Actor: Author or student

Precondition: The Author/student has navigated to the website of the Online Tutor System.

Trigger: The Author/student clicks the button to register for the Online Tutor System.

Successful End Condition: The Author/student is successfully registered and provided access to the Online Tutor System.

Failed End Condition: The Author/student is not successfully registered and does not have access to the Online Tutor System.

Steps:

1. The Author/student fills in his/her NetID.
2. The Author/student fills in his/her password corresponding with his/her NetID.
3. The NetID and password are the same NetID and password as registered at the University of Massachusetts.
4. The Author/student clicks the 'register' button.
5. The Author/student is registered in the Online Tutor System.
6. The Author/student is redirected to his/her homepage (of which the format for Author and student varies).

Exceptions:

- The Author/student enters an incorrect NetID that is not registered at the University of Massachusetts. In this case a message will be displayed that notifies that the NetID is incorrect.
- The Author/student enters a password that does not correspond to the NetID that is registered at the University of Massachusetts. In this case a message will be displayed that notifies that the password is incorrect..

#### 8.11 STUDENT SELECTS QUESTION TO ANSWER

Description: Student views a question that he would like to answer

Primary Actor: Student

Precondition: Student is logged in and is in an assignment

Trigger: The student attempts to select a new question to attempt to answer

Success End Condition: Question that the student selects successfully loads

Failed End Condition: The question that is selected does not load

Steps:

1. Student scrolls through the list of questions in the assignment.
2. Student selects the question they would like to answer from the list.
3. Webpage for the selected question loads

4. Student can read and answer question

Exceptions: None

#### 8.12 STUDENT LOGS IN

Description: The student is logging in, in order to access the tutor system using their NetID and password.

Primary Actor: Student

Secondary Actor: System

Precondition: The student is on the login page of the system.

Trigger: The student wants to log into the tutoring system.

Successful End Condition: The student successfully logs into the tutoring system.

Failed End Condition: The student is unable to log into the system because of an incorrect NetID or password or both

Steps:

1. The student enters their NetID in the username textbox
2. The student enters their password in the password textbox
3. The student clicks on the LOGIN button to enter the system

Exceptions:

- If the student does not enter the correct NetID or password the system will not log the student in and a message will appear stating that the NetID or password that they entered is incorrect and to please try again.

### 8.13 STUDENT VIEWS ASSIGNMENTS

Description: Once logged in, the student can view available assignments

Primary Actor: Student

Precondition: Student is already logged in

Trigger: Student logs in

Successful End Condition: Student can view all questions in an assignment

Failed End Condition: Student is unable to see any questions in the assignment

Steps:

1. Student clicks on desired assignment
2. Student can select any of the question(s) in the assignment
3. Student can go back to home page and select any other assignment

Exceptions:

- There are no assignments available, student has nothing to view.

Current Assignment View						
Home	<p style="text-align: center;"><b>Current Question List</b></p> <table border="1" style="width: 100%;"> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3. ....</td></tr> </table> <p style="text-align: center;"><b>Add a Question</b></p> <p style="text-align: center;">Select a Question Source</p> <table border="1" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center; padding: 20px;">Create a Question....</td> <td style="width: 50%; text-align: center; padding: 20px;">View the Question Bank....</td> </tr> </table>	1	2	3. ....	Create a Question....	View the Question Bank....
1						
2						
3. ....						
Create a Question....	View the Question Bank....					
Logout						

Figure 4: Assignment View from the student's perspective

#### 8.14 STUDENT VIEWS QUESTION

**Description:** The student views a question that is part of an assignment.

**Primary Actor:** Student

**Secondary Actor:** System

**Precondition:** The student is logged into the system.

**Trigger:** The student clicks on the question to view it.

**Successful End Condition:** The student views the question they have selected.

**Failed End Condition:** The student is unable to view the question.

**Steps:**

1. The student selects an assignment to view.

2. The student then selects a specific question to view.
3. The student views the question.

Exceptions: None

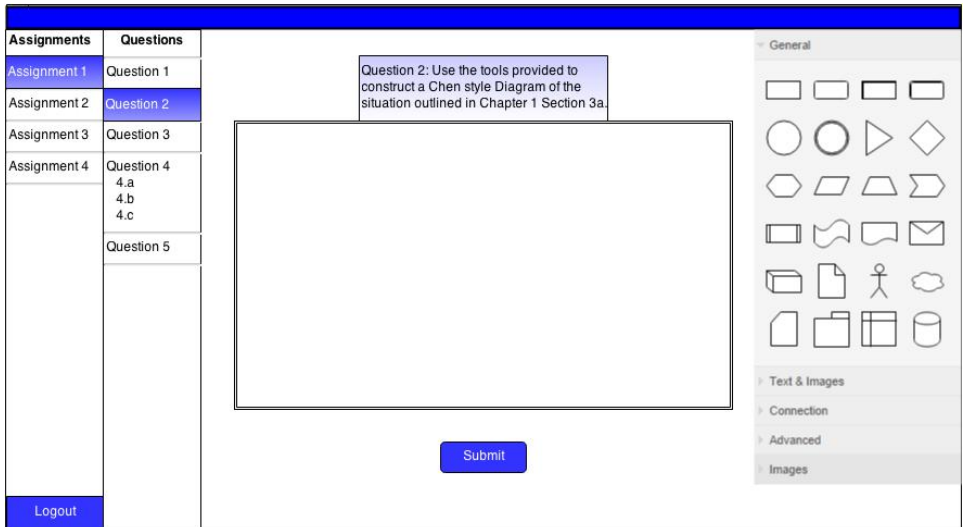


Figure 5: Assignment View from the student's perspective

## 8.15 AUTHOR

Primary Actor: Student

Precondition: Student has previously answered the question that he/she wants to submit.

Trigger: Student wants to submit a question.

Successful End Condition: Question is submitted.

Failed End Condition: Student does not submit the question.

Steps:



1. Student clicks on submit.
2. Student sees a feedback for the question he answered.

Exceptions:

- Internet goes offline while the student is submitting the question.
- Student gets the wrong feedback

#### 8.16 STUDENT VIEWS FEEDBACK

Description: After submitting the question the student is able to see the feedback that is given for the question based on if they answered the question correctly or not.

Primary Actor: Student

Secondary Actor: System

Precondition: The student has selected a question and answered the question.

Trigger: The student submits the answer to the question.

Successful End Condition: Feedback is displayed on the screen for the student to read and use to help make their answer correct if it is incorrect.

Failed End Condition: There is no feedback that gets displayed.

Steps:

1. Once the answer has been submitted the system compares it to the correct answer given.
2. If the answer is correct the question page displays the feedback that is written by the author for a correct answer such as good job or correct.

3. If the answer is incorrect the question page displays the feedback that is written by the author for an incorrect answer such as a hint or common mistake.
4. The student reads the feedback that is displayed on the screen.

Exceptions:

- The author does not enter in any feedback for correct answers so no feedback will be displayed.
- The author does not enter in any feedback for incorrect answers so no feedback will be displayed.

#### 8.17 AUTHOR LOGS IN

Description: The author is logging in, in order to access the tutor system using their NetID and password.

Primary Actor: Author

Secondary Actor: System

Precondition: The author is on the login page of the system.

Trigger: The author wants to log into the tutoring system.

Successful End Condition: The author successfully logs into the tutoring system.

Failed End Condition: The author is unable to log into the system because of an incorrect NetID or password or both

Steps:

1. The author enters his NetID in the username textbox
2. The author enters his password in the password textbox
3. The author clicks on the LOGIN button to enter the system

Exceptions:

- If the author does not enter the correct NetID or password the system will not log the student in and a message will appear stating that the NetID or password that they entered is incorrect and to please try again.

#### 8.18 AUTHOR VIEWS THE QUESTION BANK

Description: The author views the questions that have already been created and are in the question bank.

Primary Actor: Author

Secondary Actor: System

Precondition: Author is logged in and there are questions in the question bank.

Trigger: The author would like to view the question bank.

Steps:

1. The author selects the questions tab.
2. The author is now viewing the question bank.

Successful End Condition: The author is able to view the question bank.

Failed End Condition: The author is unable to view the question bank.

Exceptions:

- There are no questions in the question bank to view. The author sees an empty question bank.

Current Assignment View						
Home	<p style="text-align: center;"><b>Current Question List</b></p> <table border="1" style="width: 100%;"> <tr><td>1</td></tr> <tr><td>2</td></tr> <tr><td>3. ....</td></tr> </table> <p style="text-align: center;"><b>Add a Question</b></p> <p style="text-align: center;">Select a Question Source</p> <table border="1" style="width: 100%;"> <tr> <td style="width: 50%; text-align: center; padding: 20px;">Create a Question....</td> <td style="width: 50%; text-align: center; padding: 20px;">View the Question Bank....</td> </tr> </table>	1	2	3. ....	Create a Question....	View the Question Bank....
1						
2						
3. ....						
Create a Question....	View the Question Bank....					
Logout						

Figure 6: View Question Bank Diagram

#### 8.19 AUTHOR ADDS A NEW QUESTION TO QUESTION BANK

**Description:** Author adds a new question to the question bank.

**Primary Actor:** Author.

**Secondary Actor:** System

**Precondition:** Author is logged into the Online Tutor System.

**Trigger:** The author would like to add a new question to the question bank.

**Successful End Condition:** A question is successfully added to the question Bank.

**Failed End Condition:** The question is no added to the question bank.

Steps:

1. Author goes to question bank section.
2. Author clicks on "Add" button to add a question.
3. Author input the question in a textbox.
4. Author provides the appropriate feedback to the question.
5. Author clicks on a "Submit" button.

Exceptions:

- Author submits wrong feedback.
- Internet goes offline while author was writing the question and/or feedback.

Create a New Question Here	
Enter Question Text Here	
Diagram Creation Pallet	Diagram Canvas
Add Question	

Figure 7: Add-Question UI

## 8.20 AUTHOR EDITS A QUESTION FROM THE QUESTION BANK

Description: The author wants to edit a question that is already in the question bank by changing any or all of the different parts of the question.

Primary Actor: Author

Secondary Actor: System

Precondition: The author has already created the question that wish to edit.

Trigger: The author is viewing a question that they wish to edit.

Successful End Condition: The question changes have been made and the author is prompted that their changes have been made.

Failed End Condition: The question does not get updated and the author is prompted saying that the question was not changed.

Steps:

1. The author selects the edit button.
2. The author edits the question text.
3. The author edits the question correct answer.
4. The author edits the question feedback.
5. The author saves the changes to the question and answer.

Exceptions:

- The author does not want to edit the question text so they do not edit it and leave it alone.

- The author does not want to edit the question correct answer so they do not edit it and leave it alone.
- The author does not want to edit the question feedback so they do not edit it and leave it alone.
- The author does not save the changes to the question so the changes are not saved.
- The author exits the system without saving the changes to the questions resulting in none of the changes being saved.

#### 8.21 AUTHOR REMOVES A QUESTION FROM THE QUESTION BANK

Description: The author views the questions that have already been created and are in the question bank.

Primary Actor: Author.

Secondary Actor: System.

Precondition: Author is logged in and there are questions in the question bank.

Trigger: The author would like to remove a question from the question bank.

Successful End Condition: The question is removed.

Failed End Condition: The question is unable to be removed.

Steps:

1. The author selects the questions tab to view the question bank.
2. The author selects the specific question that they would like to remove.

3. The author presses remove question.

Exceptions:

- The question bank is empty and therefore the author is unable to remove any questions.

## 8.22 AUTHOR VIEWS A QUESTION

Description: The author views questions that have been created.

Primary Actor: Author

Secondary Actor: System

Precondition: The author is logged into the system.

Trigger: The author has created a question and would like to view the question.

Successful End Condition: The author views the question that they would like to view.

Failed End Condition: The author is unable to view the question that they want to view.

Steps:

1. The author selects the questions tab from their view.
2. The author then scrolls through the list of questions.
3. The author then selects the question they would like to view.
4. The author then views the question.

Exceptions: None



## 8.23 AUTHOR COPIES A QUESTION

Description: The author takes an existing question and copies it creating a new question.

Primary Actor: Author

Secondary Actor: System

Precondition: The author is logged in and there is a question to copy.

Trigger: The author wants to copy a question.

Steps:

1. The author selects the questions tab to view the question bank.
2. They select the question which they would like to copy.
3. They choose to copy the question.
4. They make any necessary edits and then save the question.
5. The question is successfully copied.

Successful End Condition: The copies a previously made question and is able to create a new one.

Failed End Condition: The author is unable to successfully copy a question. Exceptions:

- There are no questions in the question bank to copy.
- They make no edits to the copied question and copy it as is.

---

## ENVIRONMENTAL REQUIREMENTS

---

### 9.1 TOOLBOX FOR DRAWING DIAGRAM

A ToolBox will help the student draw the diagram. The student will first select whether he wants to draw a Chen's Diagram or a Crow's Foot Diagram. The toolbox will then adjust accordingly, displaying the shapes and edges that are common to the chosen diagram. This will include squares, circles, directed edges, and tick marks (for Crow's Foot).

### 9.2 SAVE PROGRESS OF CURRENT ASSIGNMENT

When a student logs in, he/she should be able to start an assignment. As the student progresses through the assignment, the answers answered by the student should be saved in the students personal database. In that way, if he/she wants to stop and continue with the assignment another time, he can do so without starting all over again.

### 9.3 LIST OF AVAILABLE QUESTIONS AND THEIR STATUS

While a student is answering questions, there will be a list of all the questions listed horizontally at the top of the page. Next to each question number will be a small image. The image will either be a green check mark if the question is answered correctly, a red x if the question is answered incorrectly or a black question mark if the question has not been answered yet. When the status of the question changes then so will the image next to the question number.

### 9.4 OPEN SPACE TO DRAW DIAGRAM

After a student selects which question they want to work on a white drawing space will be given to them in which to draw their answer. Off to the side of this space will be the toolbox which they use to do the drawing. There will also be a submit button off to the side somewhere which is what the student is to press when they're finished with their answer.

### 9.5 COMPATIBILITY WITH MULTIPLE BROWSERS

The program will open and be usable with all major internet browsers. Including Safari, Chrome, Firefox, Internet Explorer.

# 10

---

## PERFORMANCE REQUIREMENTS

---

### 10.1 CORRECTNESS ANALYSIS

The ER diagram drawn by the student generates a database schema that will be compared with schema provided by the author in the question. If they are equal, then the solution provided by the student is correct, otherwise is wrong. This should be done in a matter of seconds.

### 10.2 QUESTION LOADING

When the student selects a new question to attempt to answer the question should load within 5 seconds when the server is not busy and should load within 10 seconds when the server is busy.

---

## SAFETY/SECURITY REQUIREMENTS

---

### 11.1 USER (STUDENT/INSTRUCTOR/AUTHOR) CORRECTLY LOGS INTO THE ONLINE TUTOR SYSTEM

Description: The user logs into the online tutor system by correctly entering his/her netID and password.

Primary Actor: User

Precondition: User navigates to the online tutor system's login web page

Trigger: User clicks the "Log In" button on the online tutor system's login web page

Successful End Condition: The user is successfully logged into his/her account and can see his/her respective home-page on the screen.

Failed End Condition: The user is brought back to the login web page and is prompted to try logging in again.

Steps:

1. The user correctly enters his/her netID.
2. The user correctly enters his/her password.
3. The user clicks the "Log In" button.

Exception:

- The online tutor system does not recognize that the user's correctly entered netID and password are associated with that user's existing account. The user is brought back to the login web page and is prompted to try logging in again.

#### 11.2 USER INCORRECTLY LOGS INTO THE ONLINE TUTOR SYSTEM

Description: The user logs into the online tutor system by entering an incorrect netID and/or password.

Primary Actor: User

Precondition: User navigates to the online tutor system's login web page

Trigger: User clicks the "Log In" button on the online tutor system's login web page

Successful End Condition: The user is brought back to the login web page and is prompted to try logging in again.

Failed End Condition: The user is logged into another user's account and can see that user's respective homepage on the screen.

Steps:

1. The user enters an incorrect netID.  
(and/or)
2. The user enters an incorrect password.
3. The user clicks the "Log In" button.

Exception: None

### 11.3 USER CORRECTLY LOGS OUT OF THE ONLINE TUTOR SYSTEM

Description: The user is able to successfully log out of the online tutor system.

Primary Actor: User

Precondition: User is logged into his/her account

Trigger: User clicks the "Log Out" button on one of the online tutor system's web pages

Successful End Condition: The user's screen shows a reply from the online tutor system that says that the log out was successful.

Failed End Condition: The user's screen displays the same page that it displayed before the user clicked the "Log Out" button.

Step:

1. The user clicks the "Log Out" button.

Exception:

- The "Log Out" button does not have the functionality to successfully log the user out of his/her account. The user's screen displays the same page that it displayed before the user clicked the "Log Out" button.

### 11.4 USER CREATES AN ACCOUNT ON THE ONLINE TUTOR SYSTEM

Description: The user is able to successfully create an account on the online tutor system.

Primary Actor: User

Precondition: User navigates to the online tutor system's

login web page

Trigger: User clicks the "Create" button on the online tutor system's create account web page

Successful End Condition: The user's screen shows a reply from the system that says that his/her account was successfully created, and the user's respective homepage is displayed on the screen.

Failed End Condition: The user receives a reply from the online tutor system that says that the account could not be created.

Steps:

1. The user clicks the "Create Account" button on the online tutor system's login web page.
2. The user correctly enters his/her netID.
3. The user correctly enters his/her password.
4. The user clicks the "Create" button.

Exception:

- The user's entered netID and/or password is not recognized by the online tutor system as pertaining to an existing student of the respective university or college. The user receives a reply from the online tutor system that says that the account could not be created.

#### 11.5 USER HAS LIMITED AMOUNT OF ATTEMPTS TO LOG IN

Description: Each user is given a certain (preset) amount of failed login attempts in a given (preset) amount of time to



log into the online tutoring system on a particular device. After a user has used up all of his/her failed login attempts on a particular device, that device will be prevented from logging into the system by that user or any other users until a certain (preset) amount of time has passed. This method is act of security to prevent users from hacking into other users' accounts.

---

## ACCURACY REQUIREMENTS

---

### 12.1 STUDENT SUBMITS CORRECT ANSWER DIAGRAM

Description: The student answers an assignment question by submitting the correct diagram.

Primary Actor: Student

Precondition: Student is logged into the system and has placed a diagram in a question answer box for an assignment

Trigger: Student submits the assignment

Successful End Condition: The student's question is marked "correct."

Failed End Condition: The student's question is marked "incorrect."

Steps:

1. The student answers an assignment question by putting a diagram in the answer box for that question.
2. The student submits the assignment.
3. The online tutoring system checks the student's diagram against the author's previously uploaded answer diagram.

4. The online tutoring system recognizes that the two diagrams are a match.

Exceptions:

- The student is unable to submit a diagram as an answer to a question. The student's question is marked "incorrect."
- The online tutoring system is unable process the student's submitted diagram so that it can be compared to the author's uploaded answer. The student's question is marked "incorrect."

## 12.2 STUDENT SUBMITS INCORRECT ANSWER DIAGRAM

Description: The student answers an assignment question by submitting an incorrect diagram. Primary Actor: Student Precondition: Student is logged into the system and has placed a diagram in a question answer box for an assignment Trigger: Student submits the assignment Successful End Condition: The student's question is marked "incorrect." Failed End Condition: The student's question is marked "correct."

Steps:

1. The student answers an assignment question by putting a diagram in the answer box for that question.
2. The student submits the assignment.
3. The online tutoring system checks the student's diagram against the author's previously uploaded answer diagram.

4. The online tutoring system recognizes that the two diagrams are not a match.

Exceptions:

- The student is unable to submit a diagram as an answer to a question. The student's question is marked "incorrect."
- The online tutoring system is unable process the student's submitted diagram so that it can be compared to the author's uploaded answer. The student's question is marked "incorrect."

# 13

---

## PROFESSOR UI REQUIREMENTS

---

### 13.1 PROFESSOR CLICKS ON SIDE OR TOP NAVIGATION BUTTONS

Description: While on any page containing navigation links in the side or top bars, the professor clicks on a nav link

Primary Actors: Professor

Steps:

1. The professor is logged into any of the main pages containing nav links
2. The professor clicks on any link

Successful Post Conditions:

- The professor is directed to the page intended by the link

Exceptional Condition:

- The professor is already on the page of the link they are clicking - nothing happens and the page does not change.

### 13.2 PROFESSOR CLICKS ON THE ASSIGNMENT SUBMISSION TICKER

Description: From the main landing page the professor clicks on the assignment submission ticker

Primary Actor: Professor

Steps:

1. The professor is on the main page after login
2. The professor clicks on the Assignment Submission Ticker Pane

Successful Post Condition:

- The professor is redirected to a larger detailed view with a time directed log of student submission stats for assignments the professor has created, or is linked to through class ownership

Exceptional Post Condition:

- The professor has no submissions in his feed - he is directed to the log but is not shown any information

### 13.3 PROFESSOR CLICKS ON THE CLASS OR STUDENT TICKER

Description: From the main landing page the professor clicks on enrolled student/ class ticker pane

Primary Actor: Professor

Steps:

1. The professor is on the main page after login
2. The professor clicks on the enrolled student/ class ticker pane

Successful Post Condition:

- The professor is redirected to a larger detailed view with the option to sort by class or student name to display stats pertaining to course enrollment and individual student assignment histories

#### 13.4 PROFESSOR CLICKS TO EXPAND THE ASSIGNMENT CREATION SANDBOX

Primary Actor: Professor

Steps:

1. The professor is on the main page after login
2. The professor clicks to expand the assignment creation sandbox

Successful Post Condition:

- The professor is taken to the assignment creation page and any potential diagrams or questions created in the sandbox are stored and transferred to the assignment creation window

## Part IV

# USE CASES



# 14

---

## ROBUSTNESS USE CASES

---

### 14.1 ONLINE TUTOR SYSTEM SHOULD NEVER CRASH

Description: Nothing any user does should crash the web browser. The online tutor system may reach an exception when performing a specific task, but it will never crash the user's browser or machine. Each online tutor system task exception should be handled.

### 14.2 UI SHOULD REACT CORRECTLY TO USER ACTIONS

Description: The UI should correctly react to what the user's actions command. If a specific user action was not accounted for when the UI was created (the UI does not have the ability to make a response to that action) the online tutor system will reach an exception and that exception should be handled by the UI remaining in its current state.

### 14.3 STUDENT SUBMITS VARIANT OF CORRECT ANSWER DIAGRAM

Description: The student answers an assignment question with a diagram that is correct, but is not exactly the same

as the author's answer diagram.

Primary Actor: Student

Precondition: Student is logged into the system and has placed a diagram in a question answer box for an assignment

Trigger: Student submits the assignment

Successful End Condition: The student's question is marked "correct."

Failed End Condition: The student's question is marked "incorrect."

Steps:

1. The student answers an assignment question by putting a diagram in the answer box for that question.
2. The student submits the assignment.
3. The online tutoring system checks the student's diagram against the author's previously uploaded answer diagram.
4. The online tutoring system recognizes that the two diagrams are alike, but are not exactly the same.

Exceptions:

- The student is unable to submit a diagram as an answer to a question. The student's question is marked "incorrect."
- The online tutoring system is unable process the student's submitted diagram so that it can be compared to the author's uploaded answer. The student's question is marked "incorrect."

#### 14.4 AUTHOR MUST COMPLETELY FILL OUT THE QUESTION CREATION FORM

Description: When an author is in the process of creating a question, he/she must completely fill out a question creation form for that question. This question creation form includes the question, which specifies the format that the answer diagram should have, and the answer diagram(s) for that question. If the author presses the form's "Submit" button before it is complete, the online tutoring system will continue to display the question creation form and highlight the fields that have not yet been completed.

---

## LOGIN/LOGOUT SYSTEM USE CASES

---

### 15.1 STUDENT OR INSTRUCTOR CORRECTLY LOGS INTO THE SYSTEM

Description: The student or instructor logs into the system with the correct username and password.

Primary Actors: Student, Instructor

Secondary Actor: System

Steps:

1. The student or instructor enters his/her correct NetID as a username.
2. The student or instructor enters his/her correct password.
3. The student or instructor clicks the "Login" button or the enter key.

Successful Post Condition:

- The student or instructor is successfully logged into his/her account on the system and can see his/her homepage on the screen.

Exceptional Condition:

- The system does not recognize that the correctly entered username and password are associated with an existing account.

## 15.2 STUDENT OR INSTRUCTOR INCORRECTLY LOGS INTO THE SYSTEM

Description: The student or instructor logs into the system with an incorrect username and/or password.

Primary Actors: Student, Instructor

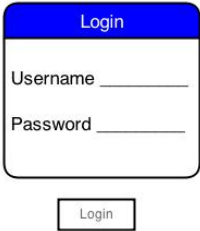
Secondary Actor: System

Steps:

1. The student or instructor enters an incorrect NetID as a username. and/or
2. The student or instructor enters an incorrect password.
3. The student or instructor clicks the "Login" button or the enter key.

Successful Post Conditions:

- The system prohibits the student or instructor from logging into the system with a NetID and password that do not match.
- The system sends a reply that says that the login was unsuccessful.
- The system prompts the user to try entering a username and password again.



The image shows a login user interface within a window. The window has a blue title bar at the top. Inside, there is a central login form. The form has a blue header with the word "Login" in white. Below the header, there are two input fields: "Username" and "Password", each followed by a horizontal line for text entry. At the bottom of the form is a rectangular button labeled "Login".

Figure 8: Login UI

### 15.3 STUDENT OR INSTRUCTOR CORRECTLY LOGS OUT OF THE SYSTEM

Description: The student or instructor is able to successfully log out of the system.

Primary Actors: Student, Instructor

Secondary Actor: System

Steps:

- The student or instructor clicks the "Log Out" button.
- Successful Post Condition:
- The student or instructor receives a reply from the system that says that the log out was successful.

Exceptional Condition:

- The "Logout" button does not have the functionality to successfully log out the student or instructor.