Team: Daniel Malmer, Gaurav Bishnoi, Rabin Ranabhat

Project: Comparative Observation for Learning or Attention (COLA)

Project Summary: The application will be used to record the on-task or off-task behavior of a child and determine whether the child under observation has difficulties compared to typical peers in the same learning environment. These data collected will assist in the psycho-educational evaluation or functional behavior analysis of school-aged children.

Requirements:

1. Business Requirements:

ID	Requirements
Student Information Form Screen	
BR-001	In the Student Information Form screen, the following student information items shall be captured: - Name of the student being observed - Student ID - Date of birth of the student - Date of consent from the parent(s) The aforementioned information shall be made mandatory to be captured.
BR-002	In the Student Information Form screen, the following information about the student's surrounding shall be captured: - Name of the teacher teaching the class - Class the student is attending The aforementioned information shall be optional to capture.
BR-003	The user shall be able to save the student information in the Student Information Form screen.
BR-004	The user shall be able to retrieve the student information from the database by entering the student ID in the Student Information Form screen.
Observation Screen	
BR-005	In the Observation screen, the behavior of the Target Student (TS) and the Comparison Peer (CP) shall be compared against the following criteria: - On-task: Observing/Listening - On-task: Producing/Participating - Off-task: Disengaged - Off-task: Verbal

	- Off-task: Motor
BR-006	The Observation screen shall allow the user to record the type of activity the student is engaged in.
BR-007	The Observation screen shall allow the user to specify the total duration of the observation and the frequency of the observation intervals. By default, the total duration of observation shall be 15 minutes and the observation frequency shall be set to 30 seconds.
BR-008	The observation shall continue even if the user fails to capture the observation data in each observation intervals.
BR-009	The user shall be routed to the Summary screen if - The total duration of the observation is complete. - The user selects chooses to end the observation before the elapse of the total duration of the observation.
Summary Screen	
BR-0010	In the Summary screen, the following information about the Target Student and the Comparison Peer shall be demonstrated as percentages: - On task behavior - Off task behavior - Aggressive behavior - Out-of-seat behavior - Observation start time - Observation end time - Time when the observation was paused (if any) - Time when the observation was resumed - Total paused time
BR-0011	The Summary screen shall allow the user to discard the observation data or navigate to the Questionnaire screen.
Questionnaire Screen	
BR-0012	In the Questionnaire screen, the user shall prompted to answer questions about the Target Student. The answer to the questions shall optional.
BR-0013	In the Questionnaire screen, the user shall be allowed to save the observation data to the database.
BR-0014	The user shall be allowed to navigate back to the Summary screen from the Questionnaire screen.

2. User Requirements:

ID	Requirements
Student Information Form Screen	
USR-001	The user shall be able to record the information about the student, the classroom the student is present and the teacher teaching the class.
USR-002	The user shall be able to clear all the fields in the Student Information Form at once.
USR-003	The user shall be able to navigate from the Student Information Form screen to Observation screen.
USR-004	The user shall be able to save the information in the form to the database and exit the application without entering the Observation screen.
Observation Screen	
USR-005	The user shall be able to set the total duration of the observation.
USR-006	The user shall be able to select the frequency of observation.
USR-007	The user shall be able to start. After starting the observation, the user shall be able to pause and resume the observation as desired.
USR-008	The user shall be able to compare the behavior of the Target Student and the Comparison Peer against one of the following criteria: - On-task: Observing/Listening - On-task: Producing/Participating - Off-task: Disengaged - Off-task: Verbal - Off-task: Motor
USR-009	The user shall be able to select one or both of the following options for off-task behaviors: - Aggressive - Out-of-seat
USR-0010	The user shall be able to record the type of activity the Target Student is engaged in at every observation interval.

USR-0011	The user shall be able to stop the observation at any time.
Summary Screen	
USR-0012	The user shall be able to save or discard the summary data displayed on the screen.
USR-0013	The user shall be able to edit the student Information in the Summary screen and save the edited information to the database.
USR-0014	The user shall be able to navigate to the Questionnaire screen.
Questionnaire Screen	
USR-0015	The user shall be able to answer questions about the student in the Questionnaire screen.
USR-0016	The user shall be able to save the answers to the questions listed in the Questionnaire screen.
USR-0017	The user shall be able to navigate the Summary screen.

3. Functional Requirements:

ID	Requirements
Student Information Form Screen	
FR-001	In the application, when the student ID is entered, the application shall determine if the student information has been previously stored in the database. If the student information has been previously recorded, the application shall load the student information into the Student Information Form.
FR-002	If the student information is not present in the database, the application shall require that following information about the student be recorded: - Name of the student - Student ID - Date of birth - Date of consent
FR-003	In the application, when the ‘Save’ button is pressed in the Student Information Form screen, the student information shall be saved in the Student table in the database.

FR-004	If all the required fields in the Student Information Form are not filled and the ‘Save’ or ‘Next Page’ button is pressed, the application shall prompt the user to fill the required fields.
FR-005	In the application, when the ‘Next Page’ button is pressed in the Student Information Form screen, the student information shall be saved in the Student table in the database and the user will be routed to the Observation screen.
Observation Screen	
FR-006	In the Observation screen, by default, the - Total Observation time shall be set to 15 minutes. - The frequency for observation shall be set to 30 seconds.
FR-007	In the Observation screen, the user shall be able to change the total observation duration to one of the following options: - 15 minutes - 30 minutes - 45 minutes - 60 minutes
FR-008	In the Observation screen, the user shall be able to change the total observation duration to one of the following options: - 15 seconds - 30 seconds - 45 seconds - 60 seconds
FR-009	In the Observation screen, the user shall be able to select the type of activity the Target Student is engaged in.
FR-0010	In the Observation screen, the following observation criteria shall be listed for both the Target Student and the Comparison Peer: - On-task: Observing/Listening - On-task: Producing/Participating - Off-task: Disengaged - Off-task: Verbal - Off-task: Motor
FR-0011	By default, all the observation criteria shall not appear highlighted.

FR-0012	On pressing the observation criteria, the button shall change the color indicating that an observation has been made against a criteria listed.
FR-0013	When one of the observation criteria is highlighted for the Target Student, all the other criteria shall appear disabled. Similar is true for the observation criteria listed for Comparison Peer.
FR-0014	When one of the disabled observation criteria is selected, the currently selected observation criteria shall appear to be disabled and the newly selected observation criteria shall appear highlighted.
FR-0015	When the Observation screen is loaded, by default, the screen shall display the 'Play/Pause' button as enabled and the 'Stop' button as disabled.
FR-0016	When the 'Play/Pause' button is pressed, the stop button shall be enabled.
FR-0017	When the 'Play/Pause' button is pressed the first time, the timer for the observation shall start. When the 'Play/Pause' button is pressed after the timer starts, the timer is measuring the time interval between each observation period shall be paused.
FR-0018	When the 'Stop' button is pressed, the 'Observation' screen shall prompt the user to confirm the action. On the observation screen, -On selecting the 'Yes' button on the confirmation screen, the user shall be routed to the Summary screen. - On selecting the 'No' button on the confirmation screen, the user shall be redirected back to the Observation screen and observation shall continue.
FR-0019	If the observation is not interrupted, the observation shall continue until the total duration elapses. At the end of the observation, the user shall be routed to the Summary screen.
Summary Screen	
FR-0020	In the Summary page, the summary table for the Target Student and the Comparison Peer shall be displayed.
FR-0021	The summary table shall contain the percentage of time Target Student is on-task versus percentage of time the student is off-task. Similar information for Comparison Peer shall also be displayed.
FR-0022	The Summary screen shall display the percentage of time the Target Student was aggressive or out-of-seat.

FR-0023	The Summary screen shall display the longest time duration the Target Student stayed on-task.
FR-0024	The Summary screen shall display the following times: -Start time for observation - End time for observation - Total duration of pause (if any) - Start time for pause (if any) - End time for pause (if any)
FR-0025	The Summary screen shall also display the student information summary.
FR-0026	The Summary screen shall also provide the option of either saving the navigating to next page or discarding observation information.
FR-0027	In the Summary screen, when the ‘Next Page’ button is pressed, the user shall be routed to the Questionnaire screen.
FR-0028	The database shall allow saving multiple instances of observations against a single student.
FR-0029	In the Summary screen, when the ‘Discard’ button is selected, the observation instance is ignored and no information shall be entered in the database.
FR-0030	In the Summary screen, after the observation data is discarded, the application shall display the Student Information Form screen to the user.
Questionnaire Screen	
FR-0031	In the Questionnaire screen, the user shall be prompted to with optional questions about the Target Student.
FR-0032	In the Questionnaire screen, the user shall be able to navigate to Summary screen.
FR-0033	In the Questionnaire screen, when the ‘Save’ button is pressed, all the observation information and the optional questionnaire answers shall be saved to the database.

4. **Non-Functional Requirements:**

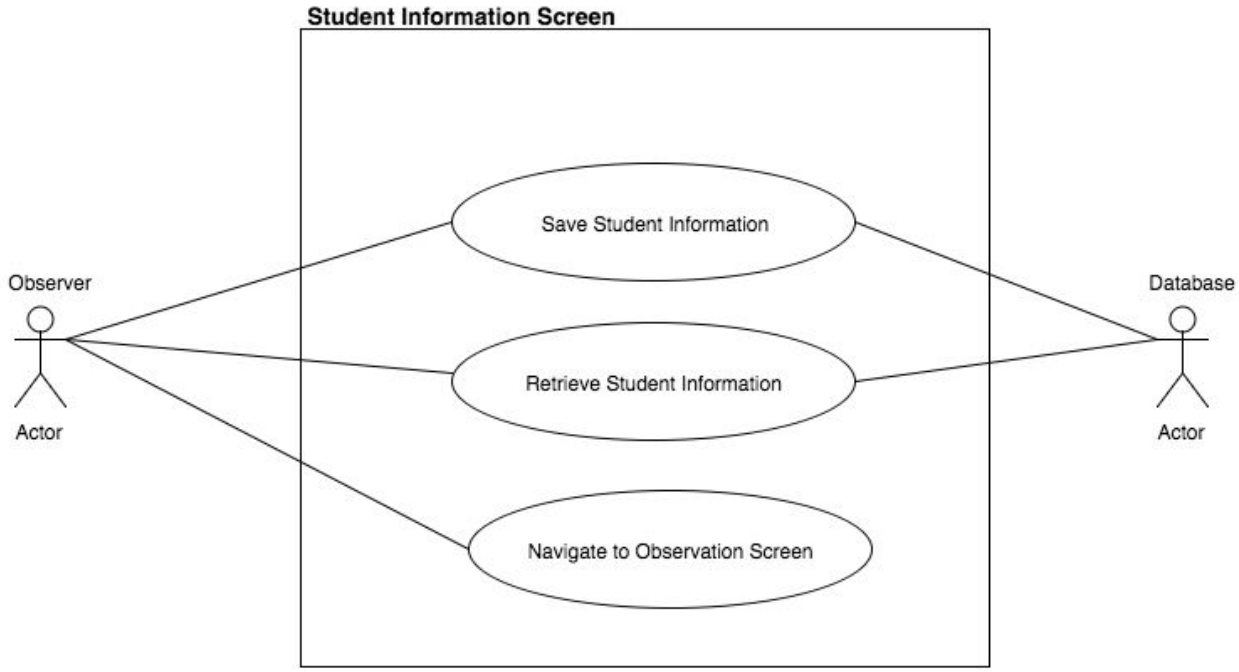
ID	Requirements
NF-001	The application shall be usable in the iPhone or Android platform.
NF-002	The application shall boot up within 10 seconds.
NF-003	The application shall be able to retrieve student information from the database within 5 seconds.
NF-004	The application shall be able to save the student information in the database within 5 seconds.
NF-005	If the connection to the database is lost, the application shall attempt to reconnect to the database every 5 seconds for 3 consecutive times before timing out and alerting the user.
NF-006	The application shall display the on-task and off-task behavior as percentages. The percentage shall display 2-significant digits.
NF-007	The application shall display the aggressive and out-of-seat behavior as percentages. The percentage shall display 2-significant digits.

Users and Tasks:

1. **Student Information Form screen**
    a. Save student information
    b. Retrieve student information
    c. Navigate to Observation screen
2. **Observation screen**
    a. Set time
    b. Observe student
        i. Start
        ii. Stop
        iii. Pause
    c. Monitor behavior
3. **Summary screen**
    a. Edit student information
    b. Discard observation
    c. Navigate to the Questionnaire screen
4. **Questionnaire screen**
    a. Save information

1. Student Information Form screen

Below is use case diagram for the Student Information Form screen:



a. Save student information

Use Case ID:	UC-01
Use Case Name:	Save student information
Description:	The observer can input the student information in the Student Information screen and save the information into the database.

Actors:	Observer, Database
Pre-conditions:	Observer has started the application on the mobile device. Observer has the required student information.
Post-conditions:	The student information is successfully stored in the database.
Frequency of Use:	Frequently used throughout the school year

<table>
<tr><td>Flow of events:</td><td>
<table>
<tr><th></th><th>Actor Action</th><th>Application Response</th></tr>
<tr><td>1</td><td>Observer starts the application.</td><td>The application starts on the mobile device and successfully connects to the database.</td></tr>
<tr><td>2</td><td>Observer inputs the information in the Student Information screen.</td><td></td></tr>
<tr><td>3</td><td>Observer presses the ‘Save’ button.</td><td>The application checks all the required field have input values and then saves the student information into the database.</td></tr>
</table>
</td></tr>
<tr><td>Variations:</td><td>The observer does not have all the necessary information to fill all the required fields in the student information screen. The application generates an error message informing the user that all the required fields have not been filled.</td></tr>
<tr><td>Notes and Issues:</td><td></td></tr>
<tr><td>Developer Notes:</td><td></td></tr>
</table>

b. Retrieve student information

Use Case ID:	UC-02
Use Case Name:	Retrieve student information
Description:	The observer can input the student ID in the Student Information screen and retrieve the stored student information from the database.

Actors:	Observer, Database
Pre-conditions:	Observer has started the application on the mobile device. Observer has entered the student ID number in the student ID field.
Post-conditions:	The student information is successfully retrieved from the database and displayed on the Student Information screen.

<table>
<tr><td>Frequency of Use:</td><td>Frequently used throughout the school year.</td></tr>
<tr><td>Flow of events:</td><td>
<table>
<tr><th></th><th>Actor Action</th><th>Application Response</th></tr>
<tr><td>1</td><td>Observer starts the application.</td><td>The application starts on the mobile device and successfully connects to the database.</td></tr>
<tr><td>2</td><td>Observer inputs the student ID in the Student Information screen.</td><td>The application searches the stored student information from the database using student ID. The application fills in the rest of the student information in the Student Information screen form.</td></tr>
</table>
</td></tr>
<tr><td>Variations:</td><td>The observer has incorrect student ID.
The observer has entered a new student ID.</td></tr>
<tr><td>Notes and Issues:</td><td></td></tr>
<tr><td>Developer Notes:</td><td></td></tr>
</table>

c. Navigate to the Observation screen

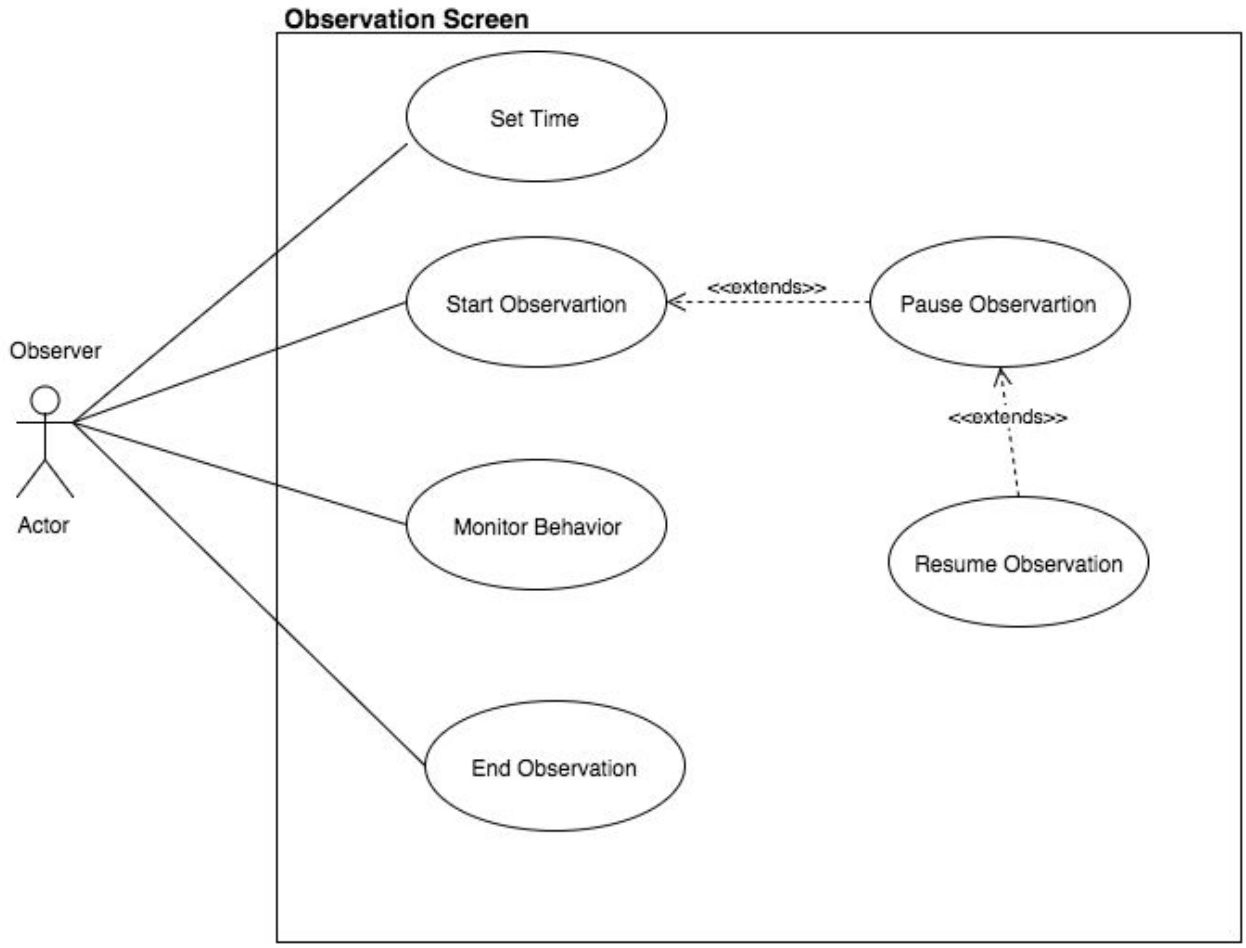
Use Case ID:	UC-03
Use Case Name:	Navigate to the Observation screen using the ‘Next’ button
Description:	The observer can press the ‘Next’ button on the application to navigate to the Observation screen on the application.

Actors:	Observer
Pre-conditions:	All the required fields in the Student Information form have been filled.
Post-conditions:	The student information is successfully stored in the database and the Observation screen is successfully loaded in the application.
Frequency of Use:	Frequently used throughout the school year

<table>
<tr><td>Flow of events:</td><td>
<table>
<tr><th></th><th>Actor Action</th><th>Application Response</th></tr>
<tr><td>1</td><td>Observer starts the application.</td><td>The application starts on the mobile device and successfully connects to the database.</td></tr>
<tr><td>2</td><td>Observer inputs the information in the Student Information screen.</td><td></td></tr>
<tr><td>3</td><td>Observer presses the ‘Next’ button.</td><td>The application checks all the required fields have input values and then saves the student information into the database. The application also routes the observer to the Observation screen.</td></tr>
</table>
</td></tr>
<tr><td>Variations:</td><td>The observer does not have all the necessary information to fill all the required fields in the Student Information form. The application generates an error message informing the user that all the required fields have not been filled.</td></tr>
<tr><td>Notes and Issues:</td><td></td></tr>
<tr><td>Developer Notes:</td><td></td></tr>
</table>

2. Observation screen

Below is use case diagram for the Observation screen:



a. Set time

Use Case ID:	UC-04
Use Case Name:	Set the time and the time interval for the observation.
Description:	The observer will be allowed to select the total time for the observation period. The options to select for total time will be provided in a drop down menu. Similarly, the observer will also be allowed to select the frequency of observation.This data will also be provided in a drop down menu format.

<table>
<tr><td>Actors:</td><td>Observer</td></tr>
<tr><td>Pre-conditions:</td><td>All the required fields in the Student Information form have been filled.</td></tr>
<tr><td>Post-conditions:</td><td>Based on the inputs, the application will determine how many times the observer will need to compare the Target Student against the Comparison Peer.</td></tr>
<tr><td>Frequency of Use:</td><td>Frequently used throughout the school year</td></tr>
<tr><td>Flow of events:</td><td>
<table>
<tr><th></th><th>Actor Action</th><th>Application Response</th></tr>
<tr><td>1</td><td>Student Information form has been successfully filled.</td><td>The student information has been successfully stored/retrieved from the database.</td></tr>
<tr><td>2</td><td>Set the total observation duration.</td><td>The application stores the total duration length time set by the user.</td></tr>
<tr><td>3</td><td>Set the frequency of observation.</td><td>The application stores the total duration length time set by the user.</td></tr>
</table>
</td></tr>
<tr><td>Variations:</td><td>The observer might choose not to change the total observation duration and the observation intervals. In that case, the default observation duration is 15 minutes and the frequency of observation is 30 seconds.</td></tr>
<tr><td>Notes and Issues:</td><td></td></tr>
<tr><td>Developer Notes:</td><td></td></tr>
</table>

b. Start observation

Use Case ID:	UC-05
Use Case Name:	Start observation
Description:	The observer will be able to start the observation and record the behavior of the child at a certain pre-defined frequency against a set of characteristics that have been defined in the Observation screen.

<table>
<tr><td>Actors:</td><td>Observer</td></tr>
<tr><td>Pre-conditions:</td><td>All the required fields in the Student Information form have been filled.

The total observation duration and the frequency of observation have been set.

The observer has selected the ‘Type of Activity’ the Target Student is involved in.</td></tr>
<tr><td>Post-conditions:</td><td>The observer will be able to perform the following actions as desired:
- Stop observation
- Pause observation</td></tr>
<tr><td>Frequency of Use:</td><td>Frequently used throughout the school year</td></tr>
<tr><td>Flow of events:</td><td>
<table>
<tr><th></th><th>Actor Action</th><th>Application Response</th></tr>
<tr><td>1</td><td>Student Information form has been successfully filled.</td><td>The student information has been successfully stored/retrieved from the database.</td></tr>
<tr><td>2</td><td>The observation duration and the frequency of observation have been set.</td><td>The application calculates the total number of observation the observer needs to perform to complete the observation.</td></tr>
<tr><td>3</td><td>The observer starts the application.</td><td>The timer for the observation starts.

The application records the time of the day when the observation was started.

The application enables the following actions:
- Pause
- End</td></tr>
</table>
</td></tr>
<tr><td>Variations:</td><td>The observer might tap the start button consecutively. In that scenario, every second tap will be registered as a pause instruction.</td></tr>
</table>

	If the Type of Activity is not selected, the application will produce an error message stating this is a required field before starting a new observation session.
Notes and Issues:	
Developer Notes:	

c. Pause observation

Use Case ID:	UC-06
Use Case Name:	Pause observation
Description:	The observer will be able to pause the observation while the observation is in session.

Actors:	Observer
Pre-conditions:	The total observation duration and the frequency of observation have been set. The observer has selected the 'Type of Activity' the Target Student is involved in. The observation has already begun.
Post-conditions:	The observer will be able to perform the following actions as desired: - Resume observation - End observation
Frequency of Use:	Frequently used throughout the school year

<table>
<tr><td>Flow of events:</td><td>
<table>
<tr><th></th><th>Actor Action</th><th>Application Response</th></tr>
<tr><td>1</td><td>Student Information form has been successfully filled.</td><td>The student information has been successfully stored/retrieved from the database.</td></tr>
<tr><td>2</td><td>The observation duration and the frequency of observation has been set.</td><td>The application calculates the total number of observation the observer needs to perform to complete the observation.</td></tr>
<tr><td>3</td><td>The observer starts the application.</td><td>The timer for the observation starts.

The application records the time of the day when the observation was started.

The application enables the following actions:
- Pause
- End</td></tr>
<tr><td>4</td><td>The observer pauses the application</td><td>The timer for the observation stops.

The application enables the following actions:
- Resume
- End

All the characteristics fields in the Observation screen will be disabled.</td></tr>
</table>
</td></tr>
<tr><td>Variations:</td><td>The observer might tap the pause button consecutively. In that scenario, every second tap will be registered as a start instruction.</td></tr>
<tr><td>Notes and Issues:</td><td></td></tr>
<tr><td>Developer Notes:</td><td></td></tr>
</table>

d. End observation

Use Case ID:	UC-07
Use Case Name:	End observation
Description:	The observer will be able to end the observation anytime while the observation is in session.

Actors:	Observer
Pre-conditions:	The total observation duration and the frequency of observation have been set. The observer has selected the 'Type of Activity' the Target Student is involved in. The observation has already begun or the application is paused.
Post-conditions:	The application will display a pop up screen prompting the user to confirm the action of stopping the observation.
Frequency of Use:	Frequently used throughout the school year
Flow of events:	

	Actor Action	**Application Response**
1	Student Information form has been successfully filled.	The student information has been successfully stored/retrieved from the database.
2	The observation duration and the frequency of observation has been set.	The application calculates the total number of observation the observer needs to perform to complete the observation.
3	The observer starts the observation.	The timer for the observation starts. The application records the time of the day when the observation was started.

			The application enables the following actions: - Pause - End
	4	The observer ends the observation.	The timer for the observation stops. The application will prompt the user to confirm the action of ending observation.
Variations:	The observer cancel the prompt confirming stopping the observation. This takes the observer back to the observation screen and the session resumes.		
Notes and Issues:			
Developer Notes:			

e. Monitor behavior

Use Case ID:	UC-08
Use Case Name:	Monitor behavior
Description:	The observer will be able to tap and select different observation characteristics detailed in the Observation screen (in each interval) after the Observation has been started.

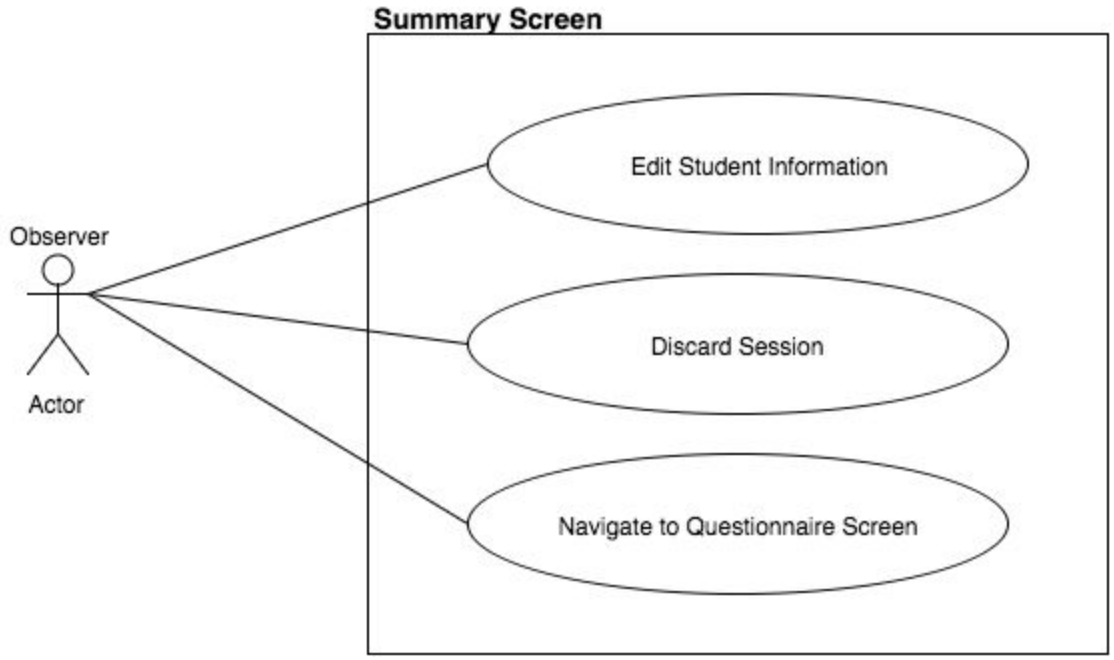
Actors:	Observer
Pre-conditions:	The observation has been started but not stopped.
Post-conditions:	Data for the Target Student and the Comparison peer have been collected against all the observation characteristics defined in the observation screen.
Frequency of Use:	Frequently used throughout the school year

<table>
<tr><td>Flow of events:</td><td>
<table>
<tr><th></th><th>Actor Action</th><th>Application Response</th></tr>
<tr><td>1</td><td>The observation duration and the frequency of observation has been set.</td><td>The application calculates the total number of observation the observer needs to perform to complete the observation.</td></tr>
<tr><td>2</td><td>The observer starts the application.</td><td>The timer for the observation starts.

The application records the time of the day when the observation was started.</td></tr>
<tr><td>3</td><td>The observer selects one of the observation characteristics for the Comparison Peer and the Target Student per interval.</td><td>At the end of each interval, the application records the selections made by the observer and then starts a new interval. At the start of the new interval, any selections made in the previous interval is removed.</td></tr>
</table>
</td></tr>
<tr><td>Variations:</td><td>The application allows the observer to select the different ‘Type of Activity’ during the session. The new selection will be captured in each following interval unless changed.</td></tr>
<tr><td>Notes and Issues:</td><td></td></tr>
<tr><td>Developer Notes:</td><td></td></tr>
</table>

3. Summary screen

Below is use case diagram for the Summary screen:



a. Edit student information

Use Case ID:	UC-09
Use Case Name:	Edit student information
Description:	The observer can edit the student information after the session is over.

Actors:	Observer
Pre-conditions:	Monitoring session is over.
Post-conditions:	The student information is edited and updated student information is displayed in the Summary screen.
Frequency of Use:	Used in a small number of sessions

<table>
<tr><td>Flow of events:</td><td>
<table>
<tr><td></td><td>Actor Action</td><td>Application Response</td></tr>
<tr><td>1</td><td>Observer clicks “Edit” over the student information on the Summary screen.</td><td>The application makes the student information fields editable and changes the “Edit” button to a “Save” button.</td></tr>
<tr><td>2</td><td>Observer inputs the information in the student information fields.</td><td></td></tr>
<tr><td>3</td><td>Observer presses the “Save” button.</td><td>The application checks all the required fields have input values and updates the student information in the Summary screen.</td></tr>
</table>
</td></tr>
<tr><td>Variations:</td><td>The observer does not have all the necessary information to fill all the required fields in the Student Information form. The application generates an error message informing the user that all the required fields have not been filled.</td></tr>
<tr><td>Notes and Issues:</td><td></td></tr>
<tr><td>Developer Notes:</td><td></td></tr>
</table>

b. Discard observation

Use Case ID:	UC-10
Use Case Name:	Discard observation
Description:	The observer can discard the observation session they just completed.

Actors:	Observer
Pre-conditions:	Monitoring session is over.
Post-conditions:	The session is discarded and the user is brought back to the Student Information Form screen.
Frequency of Use:	Used in a small number of sessions

<table>
<tr><td>Flow of events:</td><td>
<table>
<tr><th></th><th>Actor Action</th><th>Application Response</th></tr>
<tr><td>1</td><td>Observer presses “Discard” button on the Summary screen</td><td>The application pops up a very cautionary message requiring that the user confirm that they want to discard the current session. The application presents two options: “Cancel” and “Discard”.</td></tr>
<tr><td>2</td><td>Observer presses “Discard” a second time</td><td>Application moves back to the Student Information Form screen.</td></tr>
</table>
</td></tr>
<tr><td>Variations:</td><td>The observer presses “Cancel” on the confirmation popup and the application is brought back to the Summary screen.</td></tr>
<tr><td>Notes and Issues:</td><td></td></tr>
<tr><td>Developer Notes:</td><td></td></tr>
</table>

c. Navigate to the Questionnaire screen

Use Case ID:	UC-11
Use Case Name:	Navigate to the Questionnaire screen
Description:	The Observer navigates to the Questionnaire screen after finishing on the Summary screen.

Actors:	Observer
Pre-conditions:	Monitoring session is over.
Post-conditions:	The application navigates to the Questionnaire screen.
Frequency of Use:	Used frequently throughout the year

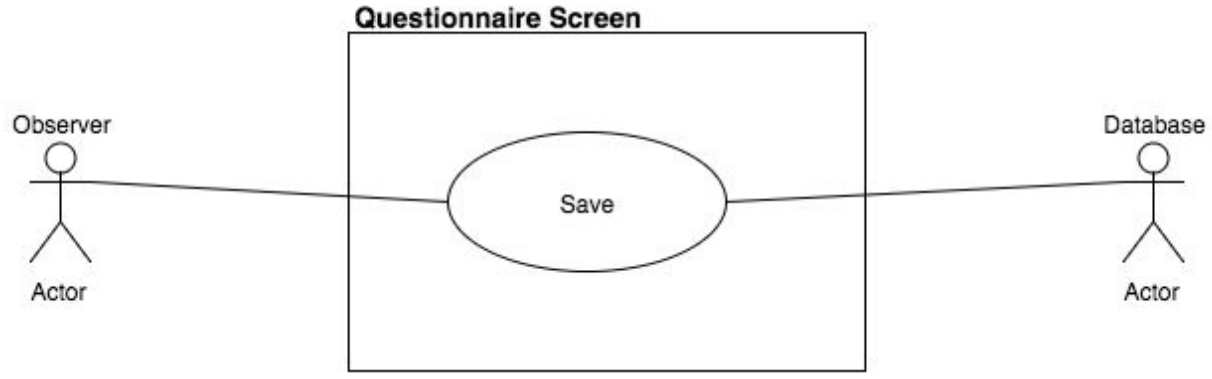
Flow of events:	

	Actor Action	**Application Response**
1	Observer presses “Save” on the Monitor screen	The application navigates to the Questionnaire screen

Variations:	
Notes and Issues:	
Developer Notes:	

5. Questionnaire screen

Below is use case diagram for the Student Information Form screen:



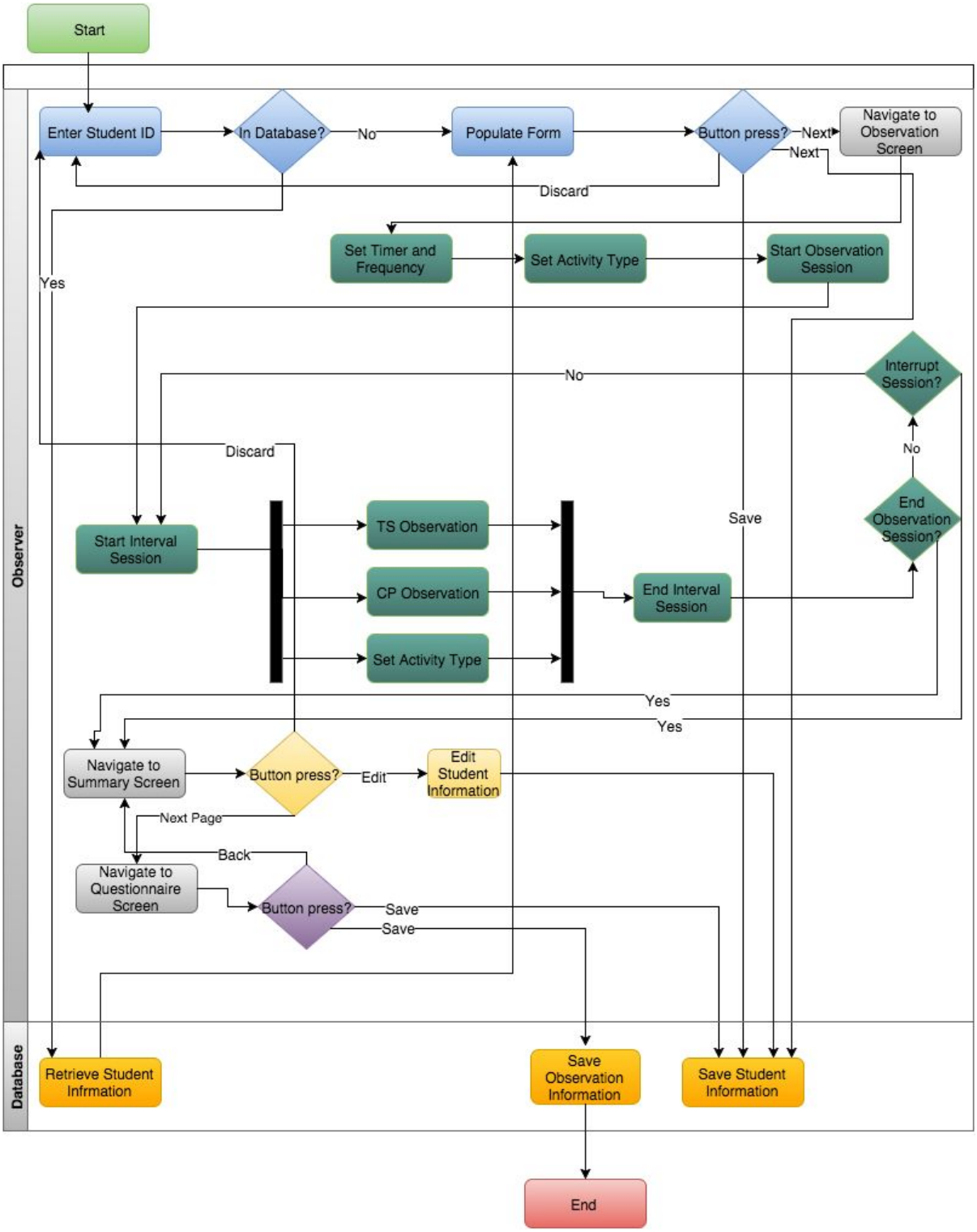
a. Save Information

Use Case ID:	UC-12
Use Case Name:	Save information
Description:	The observer will be prompted to answer certain questions about Target Student. Observer will give feedback about and take critical notes of TS. This is optional and observer can skip or save the empty response.

<table>
<tr><td>Actors:</td><td>Observer, Database</td></tr>
<tr><td>Pre-conditions:</td><td>All the observations have been made and summary page has been saved.</td></tr>
<tr><td>Post-conditions:</td><td>Observer has added remarks and notes about TS. Database will be updated with the student information if edited and with the observation session.</td></tr>
<tr><td>Frequency of Use:</td><td>Frequently used throughout the school year</td></tr>
<tr><td>Flow of events:</td><td>
<table>
<tr><th></th><th>Actor Action</th><th>Application Response</th></tr>
<tr><td>1</td><td>Observer answers the questions provided in the Questionnaire page.</td><td>The observer’s response has been recorded.</td></tr>
<tr><td>2</td><td>Observer ‘saves’ the response.</td><td>Observer’s response, observation session, and student information (if edited) has been successfully stored in the database.</td></tr>
</table>
</td></tr>
<tr><td>Variations:</td><td>Observer may skip the questions or save empty page. Both of these responses will still save data to the database.</td></tr>
<tr><td>Notes and Issues:</td><td></td></tr>
<tr><td>Developer Notes:</td><td></td></tr>
</table>

Activity Diagram:

We were able to show the behavior of the entire application on the Activity Diagram below:



We color-coded the diagram to show which actions belong to which screen. Blue is the student information form screen, dark green is the observation screen, yellow is the summary screen, purple is the questionnaire screen, orange are actions from the database, and grey are the navigations.

Data Storage:

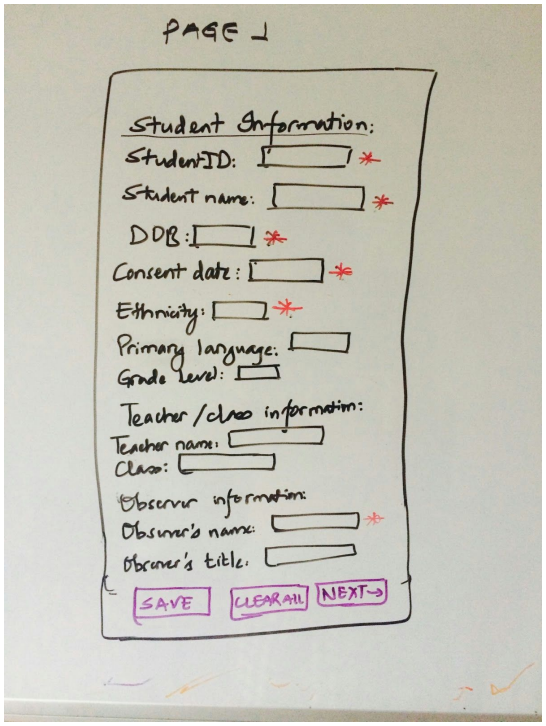
There will be two types of data storage in our phone application: persistent database storage and temporary JSON storage. Database storage will be used to permanently store student information and completed observation sessions. JSON storage will be used to hold information from the current observation session before it is stored to the persistent database, if that information is too big to hold in RAM.

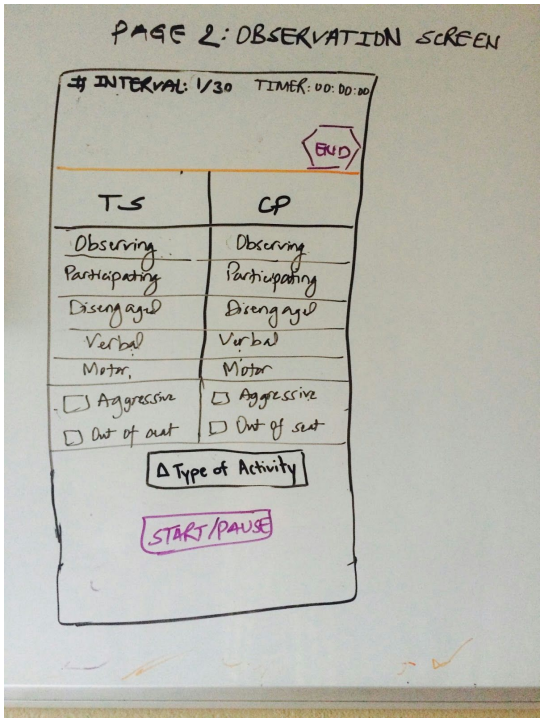
PhoneGap has an API for creating and manipulating SQL Lite databases on Android, BlackBerry, and iPhone operating systems. The API looks straightforward to use (http://docs.phonegap.com/en/1.2.0/phonegap_storage_storage.md.html) and should cover all of our needs. The database itself will be stored locally on a given phone.

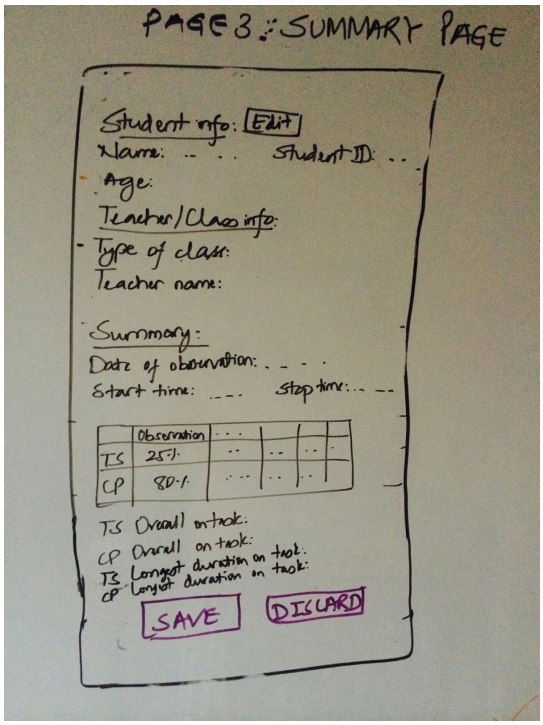
We will attempt to hold the information from the current observation in memory, but as none of us have worked on phone applications before, we're not sure how well the phone will handle holding so much information in memory. If needed, we will store the information from the current observation as JSON formatted text files locally on a given phone. In short, the JSON format is a hierarchal set of "field" : "value" pairs where any field can have an arbitrary number of fields beneath it. This is particularly nice for sparse data as any fields that aren't filled by the user (eg. questionnaire data, observations of the Comparison Peer, etc.) are not included in the JSON text file, meaning we are not wasting space by filling in a bunch of nulls. When the session is saved, the JSON information will be sent to the persistent database to be stored permanently.

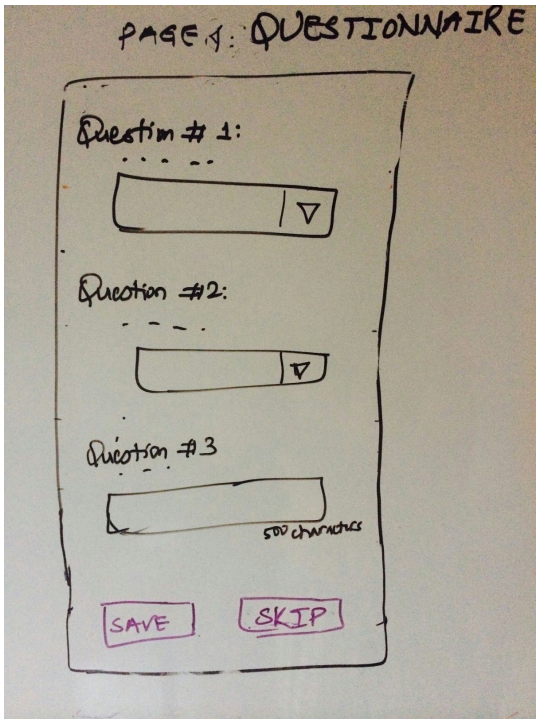
UI Mockups:

Below are the UI mockups for the four screens on the app:







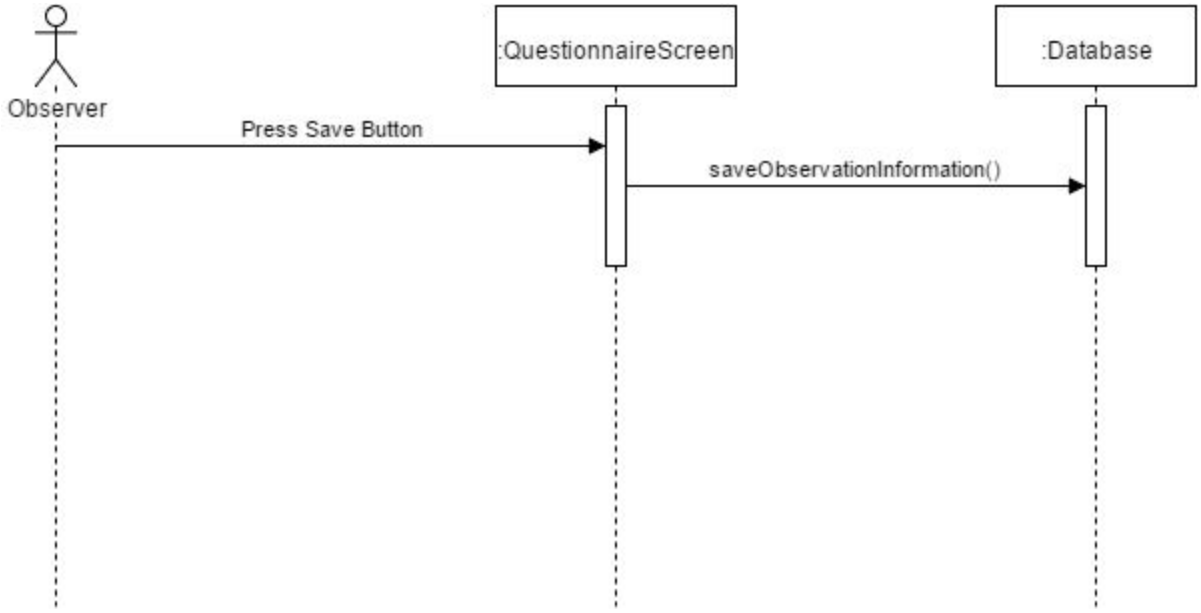


User Interactions:

Based on the use cases and the UI mockups the following sequence diagrams identify the three major ways in which the user of the application will interact with the application.

User Interaction Scenario #1:

The following user interaction diagram shows when the user will be in the Questionnaire screen of the application and hits the save button to save the observation data to the application database. The following sequence diagram shows the sequence of function calls that will happen on pressing the 'Save' button.



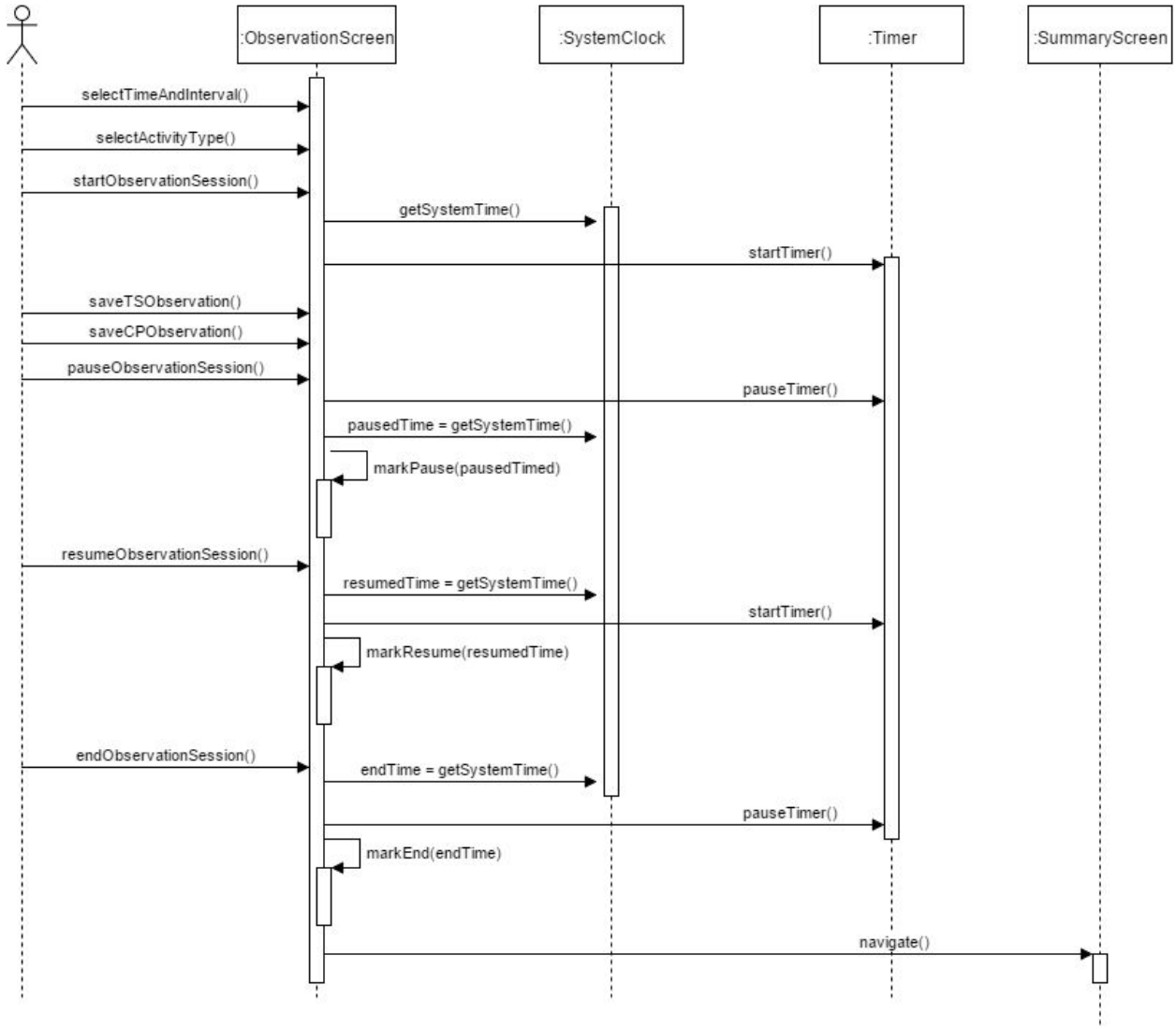
User Interaction Scenario # 2:

The following user interaction diagram shows the interaction of the user with the application when the user is in the Observation screen. In the following diagram, the user sets the time and interval to perform the observation.

Following that, the user selects the type of activity the Target Student is engaged in. After recording the background information the user starts the observation session that will also start the timer associated with the observation page. The application also gets the system time to record the observation start time. When the observation session starts, the user saves the observation data for the Target Student and the Comparison Peer. After collecting the data for a couple of intervals, the user pauses the observation session.

When the observation session is paused, the timer is paused and the application gets the system time to record the time when the pause started. Following the pause, the user resumes the observation session. On resuming the observation session, the application starts the timer again and records the system time to determine when the application is resumed again.

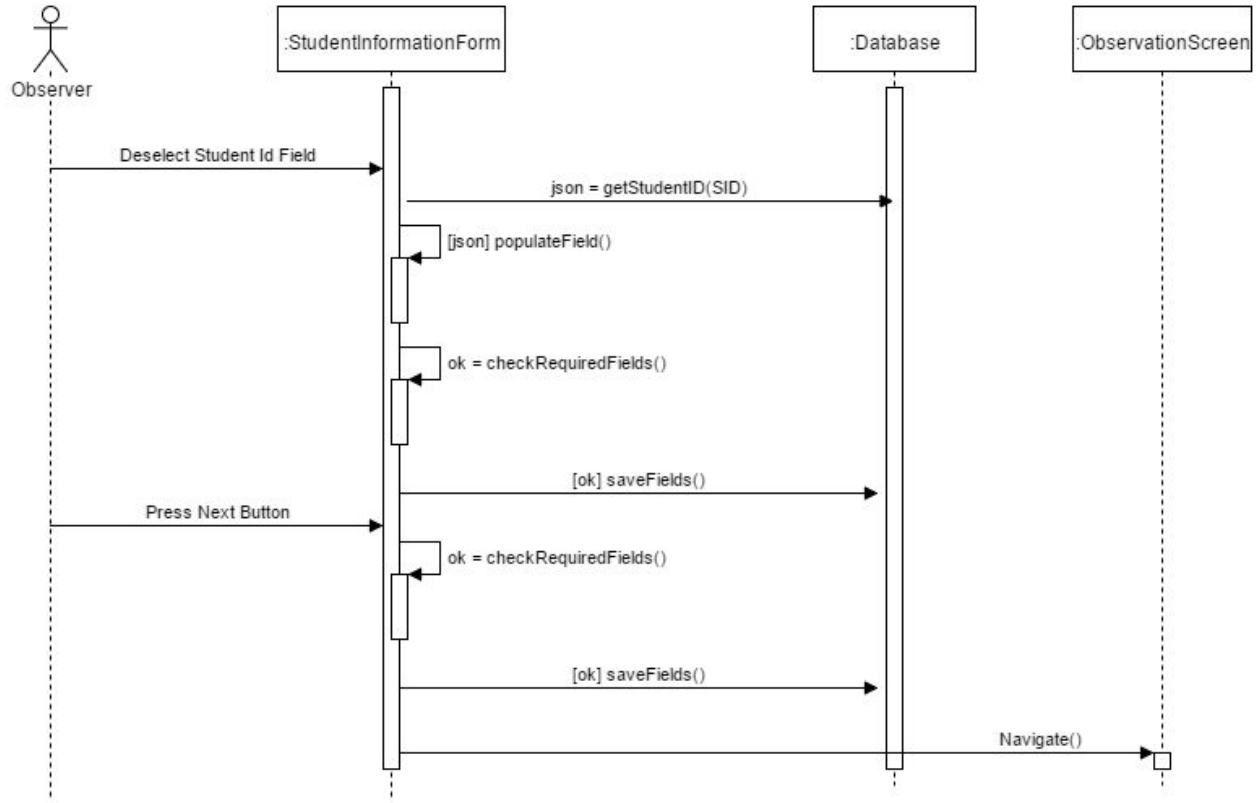
After resuming the application, the user ends the observation before the application runs for a set duration of time. When the observation session is ended, the application pauses the timer, gets the system time to record the observation end time and then routes the user to the next page.



User Interaction Scenario #3:

The following user interaction diagram displays the interaction of the user and the application in the Student Information Form screen. In the user interaction diagram, when the user unselects the student ID field, the application sends a JSON string to the database to query the student information related to the student ID. When the student information is retrieved from the database, the fields in the Student Information Form screen are populated. After that, all the fields are checked to ensure that all the required fields are filled. Following that, the student information may be modified (if desired). This student information is then saved to the database.

On pressing the ‘Next’ button in the screen again, the application ensures that all the required fields are filled. The application then save the student information to the database. Following that, the application routes the user to the Observation Screen.



Class Diagram:

Our class diagram is below. Each screen on the app will be controlled by an instantiation of an object for that particular screen. Each screen object implements a Page interface, forcing the screen object to define a navigate function to push it's information to the next page. We feel this class structure will allow for easy addition and deletion of screens in the future.