

Hong Kong Institute of Vocational Education (Tsing Yi)

Department of Information and Communications Technology

Higher Diploma in Software Engineering

Final Year Project (ITD3309)

Final Report

(2011/2012)

Distance Learning on Android Tablet – LearnAble!

Supervisor:	Clarence Lau Esther Yuen
Student:	Tai Ching Kiu Fung Ka Yiu Wong Ho Fung

We declare that this is a group project and that no part of this submission has been copied from any other student's work or from any other source except where due acknowledgement is made explicitly in the text, nor has any part been written for us by another person.

Student	Contribution to the project (%) (Total 100%)	Signature
Tai Ching Kiu	40	
Fung Ka Yiu	40	
Wong Ho Fung	20	

Abstract

The objective of this project is to develop an online tutoring system for android. System includes functions such as audio chat, white board, interactive question and answer, learning materials sharing. Those functions operate during tutorial or afterward to help students taking distance tutorial provided by teachers.

To introduce the project in progress, here are contents of the report:

Abstract is included the objective and introduction of this report.

Introduction is description document structure and the project.

Requirement includes the scope of the proposed system, the description of functions provided and data processed by the system which give you more understanding to the requirement of the system.

Documentation for problem analysis will discuss about how the problem will be solved with different kinds of diagram like Use Case diagrams with description, Class diagram, State Transition Diagram and Sequence Diagram.

Documentation for detailed design includes the data design express by ERD, software/hardware architectural design and user interface design.

Critical Evaluation will talk about the problem encountered, if there any changes in the project schedule, the proposed system's limitations and potential difficulties associated with the suggested progression route.

Detailed Project Plan indicates the progress will implement in the development period.

Reference will list the references which used to help with the development.

Appendices show if any remarks for this report.

Acknowledgement

In the period of final year project, many people have participated in our project. Give many different ideas, advices to us. First of all, we would like to thank you all of you who help us and take care us in the project especially:

Clarence Lau –

Knowledgeable in both practical and conceptual skills. You always keep reminding us to move forward, suggest different kinds of skills, push us to explore. We always feel sorry because lots of technical problems trapped us. We cannot show you the greatest software and design. We hope these final products will be full of quality.

Esther Yuen –

You are the CO-supervisor, you give us one more way to think especially for women minds. How to design the user interfaces to make the application being more user-friendly. Keep us open mind, care about our emotion. We hope the final products will be a grateful.

Tony Siu –

Second Reader is not one who keeps working with us. Therefore you can give us more opinions in different other ways. You share your points of view of Internet Programming. You make us to improve, you make us to work hard. Thank you Mr Siu.

Family –

We always work till mid-night, we always work under pressure. Our Emotions are always unstable. Thank you father and mother from each members, thank you for your understand. I hope this final year project can show you how powerful we are.

Online Reference-

StackoverFlow.com is really a great site for us. There are many experts. We can learn many things from website. Many technical problems are solved reference by the Q&A answer. Thank you experts all over the world.

Open sources software-

Part of our application relied on open source library. We found the power of community is great and sharing the source code with others is not selfish. We learn that “Contribution” is important for open source software. We hope we can contribute on open source project in the future.

Table of Contents

Contents

Abstract.....	2
Acknowledgement	3
Table of Contents	4
List of Tables and Figures.....	6
Introduction	7
The Requirement	8
Scope of the Proposed System	9
Description of Function provided.....	12
Data Processed by the system	17
Non-Functional Requirement	19
Documentation of problem analysis	23
Entity Relationship Diagram.....	24
Class Diagram	25
Use Case Diagram	32
Use Case Description.....	37
Control Flow Diagram	51
State Transition Diagram	65
Sequence Diagram.....	74
Object Collaboration Diagram	105
Data Dictionary	128
Documentation for detailed design.....	130
<i>Data Design</i>	131
Software/Hardware architectural design(System Design)	132
procedural design (module).....	133
user interface design	136
Implementation.....	137
Test Plan and Result	138
Changes to design and justification of changes.....	170

Results and conclusions	172
Summary and a critical discussion of the results, conclusions	173
Problems/difficulties encountered	174
Delays/changes in project schedule	176
Limitations of the proposed system.....	177
Subsection suggesting further developments to be undertaken.	179
Reference	181

List of Tables and Figures

- Entity Relationship Diagram
- Class Diagram
- Use Case Diagram
- Use Case Description
- Control Flow Diagram
- State Transition Diagram
- Sequence Diagram
- Object Collaboration Diagram
- Data Dictionary

Introduction

In this project, we are going to develop an online tutoring system. And here is the introduction to the proposed system. This document included the followings:

In the requirements part, the clarified requirement will be introduced. The Scope of the proposed system, the Description of function provided and data processed by the system to introduce what the proposed system would like.

For Documentation for problem analysis, we use different kinds of diagram such as use case diagrams, Class diagram, State transition diagram and Sequence Diagram to introduce the problem analysis of the proposed system and the whole design of the proposed system.

Documentation for detailed design include the data design, the software/ hardware architectural design and user interface design will show the proposed system more detailed.

In Critical Evaluation revealed problem and difficulties encountered. If there are any delays or changes in the project schedule, the limitation of existing proposed system. And the potential difficulties associated with the suggested progression route.

Also during the previous study for the topics, many References are used. And all stated for your references too.

The Requirement

- Scope of the proposed system
- Description of functions provided
- Data Processed by the system
- Non-functional requirements

*Scope of the Proposed System***XMPP Back-end**

Support other function which needs to share data to other device by command, such as PowerPoint presentation and White Board. Those functions will transform the action into different command which defined for different action. Then Send to openfire server uses XMPP then the openfire server will distribute to every client device in the same lesson. When the XMPP client receives the message, there will be a command handler to call the PowerPoint or White Board function to display the result from the command.

Asking Question

It is the function that student can ask question to teachers while the lesson is going on by typing text in a right text box. And other student can see the question on the tablet able to like the question if they have the similar question about the lesson, and the list of question will set their priority according to the amount of “like” every time when the client device refresh question list from the server. And tutor can answer the question through the lesson verbally in front of the camera. After the question answered, the tutor will press a button represent the answer is answered and the question will not be displayed after next refresh.

Voice Chat

It plans to provide voice chat between teachers and students in the same session. After select one of the user in the classroom, and able to chat with privately by text and there will be a button and touching the button and speak to the microphone and able to transfer voice stream to other user and recipient during the lesson. And the live video streaming of recipient's device will voice down little bit and make the recipient able to listen to sender's voice stream. And there will not be more than one user in this chat able to click the button at the same time.

Lesson Video Streaming

To fulfill the need of distance learning, real time lesson video streaming is needed to provide. Camera will be captured teacher face. Student can see and listen to what teacher said. Just like watching TV but educational TV. Student just stay at home or even anywhere which have high internet speed, then he or she can attend the lesson perfectly. That is much more flexible and convenient. Some student may not be available in real time lesson; he or she can also attend the archive lesson. Recorded video will be played with other function like white board. Just like live lesson.

PowerPoint presentation synchronization

It allows teacher showing the PowerPoint to students' device in the same page with some advance technology. However animation and page transition of PowerPoint is not able to show because there are not enough technology to achieve this kinds of operation. Students are able to receive whenever teacher change the page of the PowerPoint and everyone would see it. Student will understand more about the topic with the commentary of teacher in lesson.

White Board

It allows teacher drawing lines and shape even adding words on the board and student can see the same drawing at the same time. System will handle pictures like (.png/.jpg) and related synchronization file.

Group Chat/One Chat

During the lesson, everyone in the same lesson able to chat to each other at the same time share feelings, discuss about the content of the lesson and anything about the topic. Also user can select one of the users in the lesson and able to chat privately with that user when any circumstances needed. That is like a private chat inside a group and they don't need to be friends in the Openfire server and able to chat to each other.

XMPP Back-end

It is a support function which helps the command of PowerPoint and the White Board function to distribute to other client device of the same. Both student and tutor of the lesson need to login to the system and allow the connection to the same Server that has an Openfire server running. Then when the one of the PowerPoint or White Board function is on, the connection will be made to the server and uses the name and password of the user which is entered before when they login to the system to login to the Openfire server automaticity. The participant of the lesson will also add to the same chat room and after that. And the client device now be able to listen to the server and able to receive message from the server. When the any of the user which have permission to make any movement to the White Board or PowerPoint. The device which made the movement which sent out the command in form of String and will sent to every device in the lesson. Then the devices will analysis the message and call different class depends on different form of command.

Asking Question

About the “Asking Question” function, the major purpose is for the student to ask question during the lesson. After the student ask a question during the lesson, the question will send to the web server since the asking question function is a webpage which allow rapid refresh to make both the question and amount of like is sync to the server. Then the question will be shown in the window of asking question after refresh. Then other student of the lesson can click the “like” button of the question if they have similar question too. Then the list of question will display question from the question with more “like” to the question with less like. Then the teacher able to answer the question during the lesson verbally and click a button means the question if answered.

Voice Chat

We now propose 1-to-1 voice chat. You can select one of the user in the same session in the lesson group chat column after clicking the one chat button near the textbox of compose message. Select one of the users in the session and able to chat with privately, then there will be a button look like a microphone and user can press that button and speak to microphone and there will be a voice stream send to recipient device and play it when message received. The voice of lesson video streaming will be turned down a little bit for better effect for recipient to listen. And sender can press button again to stop the recording and stop a voice stream.

Lesson Video Streaming

Attend Live Lesson

When open the lesson page, video should be automatically loaded. System will go to Server to find out the video path that streaming the lesson video. To ensure the video more real times and less delay, resolution may only provide an optimization level around 320*240 with H264 video codec and AAC audio codec. AAC is a better solution because in a same bitrate, the sound quality of AAC is even better than MP3 when the bitrate is quite low. That is suitable for live streaming. BBC radio in United Kingdom also chooses AAC for its internet broadcasting. Attendance will be record after finishing the entire lesson.

Attend Record Lesson

Similar to live lesson, video should be loaded after open the lesson page. Since the video is recorded, Server will go online to find out the video path. HTTP Progressive Download or RTSP technology download may invoke depends on the situation. Player can play the video when HTTP progressive is downloading the file. RTSP Technology allows time shifting. So at least one of skill will be used. Attendance will be record after finishing the entire lesson.

Start Live Lesson

Teacher need to prepare few things. A computer connects with camera or webcam is need. If any school will use our solution, computer and camera can set up first in the room permanently. Then teacher only need to enter the require information and click Stream so the video will start upstream to our Wowza Streaming Server.

To start a lesson, Teacher needs to use its tablet to login to our system and go into the lesson page. Create require elements like White Board, Power Point, Question Bank etc. and then click "Start Lesson". Then the lesson will be available and can be found in the category. Student then now can go into the page and attend the lesson.

Record Lesson

After finishing a lesson, teacher can choose whether the video will be recorded down and student can look back the lesson just like MyTV provided by TVB. If yes, student can view the lesson any time after the lesson is finished. If not, video will still store in the system and mark as unreadable. If sometimes teacher would like to make the video available, they no need to record the lesson again.

PowerPoint presentation synchronization

View PowerPoint

The PowerPoint file would be uploaded by the teacher before lessons begin, and the system will capture every page of the PowerPoint and send to the server which hold the lesson. Then the picture will sent to every students' tablet computer then able to view the PowerPoint according to which page that the teachers turns to. And a command of change page will send to every tablet computer in the lesson and will change the page. And every student would be synchronized to same page of the PowerPoint and able to follow what teacher saying about the topic. However, the animation of the PowerPoint is not able to show because there is no any useful library to use and implement in the Android Tablet. So only static PowerPoint will be showed.

XMPP Instant Messaging

Everyone in the same lesson able to join a group chat which everyone can text messaging. Like the XMPP back end function above, connection need to be made first and login to the system, also a room need to create and let everyone to join the group when lesson begin. And there will be group chat which everyone in the same chat group at first when the user enters the group. And user can chat with all users in the lesson at the same time. Also there will be a toggle button let user change to whenever group chat or private chat with specific user in the lesson. User can chat with other the users in the same lesson after select the user who want to chat privately with.

White Board

Share Whiteboard

Teacher could share whiteboard including drawing line, circle with selected color. And then the drawing data would send to all students' device. Therefore, student can see the same drawing at the same time. What is more, teacher could undo the drawing, the undo process would effect on students' screen.

View shared whiteboard

Student could view the shared whiteboard provided by teacher. When teacher draw anything on his/her screen, student's whiteboard would show the same drawings. Also, student could jot his own note (similar to drawing function) on his screen or save the screen for note taking

Data Processed by the system

Instant Message

About XMPP Back-end and XMPP Instant Messaging, the data processed by the system includes the user who in the lesson, the messages sent to each other.

Asking Question

For the asking question, the system process the like amount of the question and display in order, then is the content of question and if the question is answered.

Lesson Video Streaming

.flv is a container storing audio file coded in AAC audio codec. Advanced Audio Coding (AAC) is a standardized, lossy compression and encoding scheme for digital audio. Designed to be the successor of the MP3 format, AAC generally achieves better sound quality than MP3 at similar bit rates

.jpg is used due to motion jpg. In the latest version, we use motion jpg for video streaming due to hardware compatibilities. Android Device is a little bit not stable in some of the device; generating motion jpg is one of the stable ways that support most of the device.

Voice Chat

Voice chat uses .mp4 format with codec h264 and acc to decode the voice the reduce size and make transfer in internet easier.

PowerPoint presentation synchronization/White Board

We use JSON to standardize the format of command

Non-Functional Requirement

Name	<u>Nonfunctional requirement- Performance constraints for instant messaging</u>
Summary	The time between send and receive time of instant messaging is low
Rationale	If a messaging receive is not fast enough, user no able to discuss about lesson content effectively
Requirements	User in the same lesson and use the instant messaging, group chat and private chat included. Need to receive new message not more than 10 seconds.
References	

Name	<u>Nonfunctional requirement- Performance constraints for Black Board</u>
Summary	The time between send and receive time of Black Board is low
Rationale	If a Black Board is not fast enough, user no able to see the drawing with the voice of teachers.
Requirements	User in the same lesson and use the White Board. Need to receive new command from teachers and display not more than 13 seconds.
References	

Name	<u>Nonfunctional requirement- Performance constraints for Live Lesson Video Streaming</u>
Summary	The delay time of live lesson video streaming is under controlled
Rationale	If the delay time is too long and keep going up while playing, other activity of the lesson might not sync
Requirements	User in the live lesson, delay time less than 2 minutes and will keep same delay time until the lesson ends.
References	

Name	<u>Nonfunctional requirement- Performance constraints for Lesson Video (Live or Not Live)</u>
Summary	The loading video feed time is reasonable
Rationale	If the video feed loading time is too long and user will lost patient to lesson
Requirements	The video feed loading time for all lesson is not more than 3 minutes, from start loading to actually playing.
References	

Name	<u>Nonfunctional requirement- Performance constraints for PowerPoint Synchronous (Turn Page)</u>
Summary	The delay time between teacher turned page to student change to page which turned
Rationale	If a turn page PowerPoint of is not fast enough, user no able to see the PowerPoint with the voice of teachers.
Requirements	User in the same lesson and use the PowerPoint Synchronous. Need to turn to new page and student turn not later than 13 seconds.
References	

Name	<u>Nonfunctional requirement- Performance constraints for PowerPoint Synchronous (Upload)</u>
Summary	The upload time of the PowerPoint is reasonable
Rationale	If a upload PowerPoint of is not fast enough, teachers tablet device may be frozen for too long.
Requirements	Teachers upload a PowerPoint file not larger than 5MB, need to finish in 1 minute.
References	

Name	<u>Nonfunctional requirement- Performance constraints for Login</u>
Summary	The upload time of the Login is reasonable
Rationale	If login is not fast enough, users' tablet device may be frozen for too long.
Requirements	User login to this system with valid or invalid username and password, the response of successful or unsuccessful login not more than 30 seconds.
References	

Name	<u>Nonfunctional requirement- Performance constraints for Available Loading Lesson</u>
Summary	The Available lesson loading time is reasonable
Rationale	If login is not fast enough, users might think they have no lesson at all.
Requirements	The available lesson loading time is less than 20 seconds.
References	

Name	<u>Nonfunctional requirement- Environment constraints for the whole system</u>
Summary	The system able to use in designated environment
Rationale	If the system is not supported, the user is not able to use
Requirements	The system able to be used in android 3.0 or later version in tablet computer.
References	

Name	<u>Nonfunctional requirement- Environment constraints for the whole system</u>
Summary	The system able to use in designated environment
Rationale	If the system is not supported, the user is not able to use
Requirements	The system able to be used in android 3.0 or later version.
References	

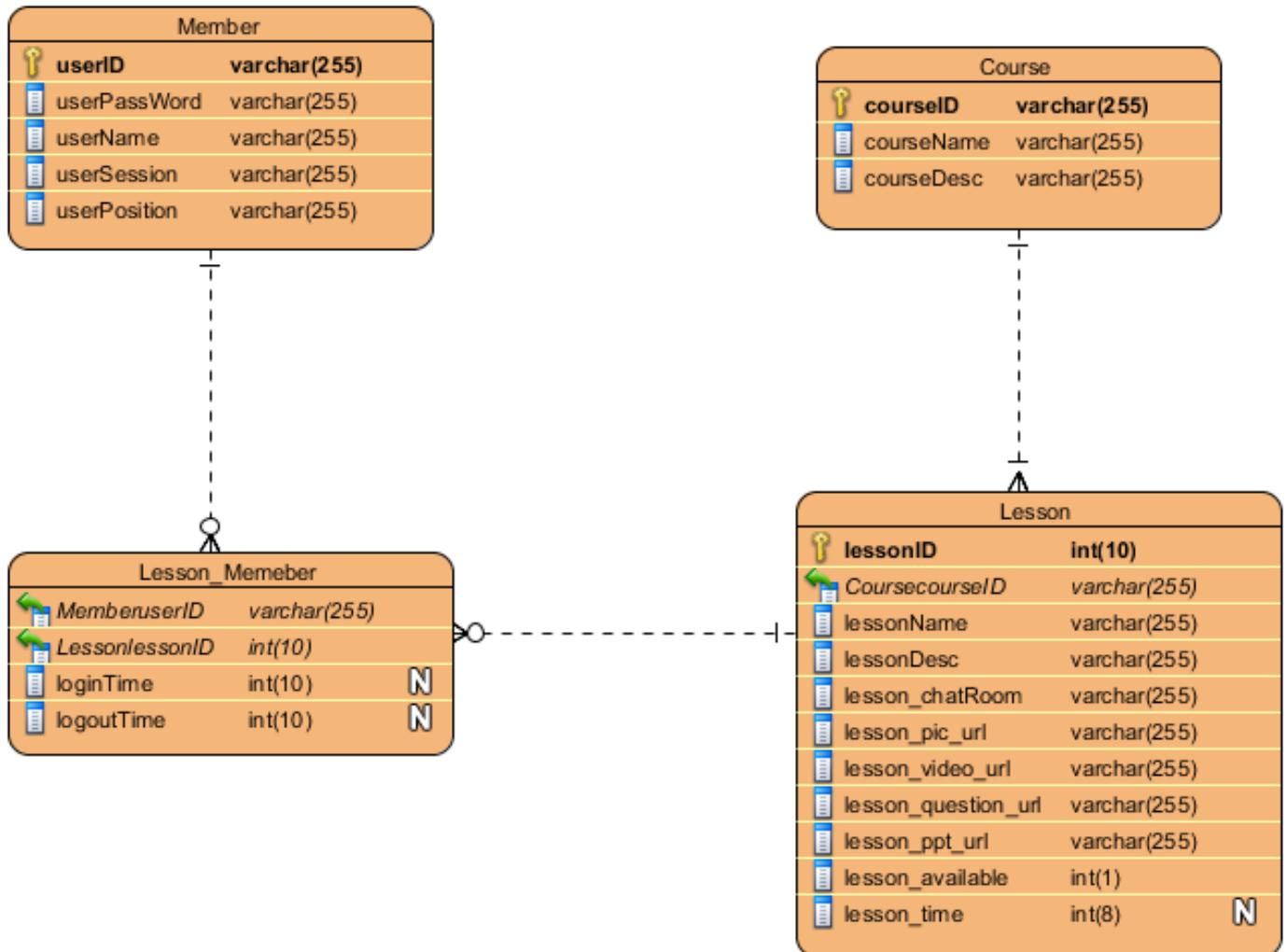
Name	<u>Nonfunctional requirement- Interface constraints for the whole system</u>
Summary	The system is easy to use for user
Rationale	If the system is too easy to use, they need time to teach users the use and they might not want to use this system
Requirements	User friendly system and user with basic computer knowledge learn how to user in 30 minutes.
References	

Name	<u>Nonfunctional requirement- Reliability constraints for the whole system</u>
Summary	The system is reliable
Rationale	If the system is not reliable, lesson may not operate smoothly
Requirements	99.5% system uptime is stable and not easy to shut down during tutoring.
References	

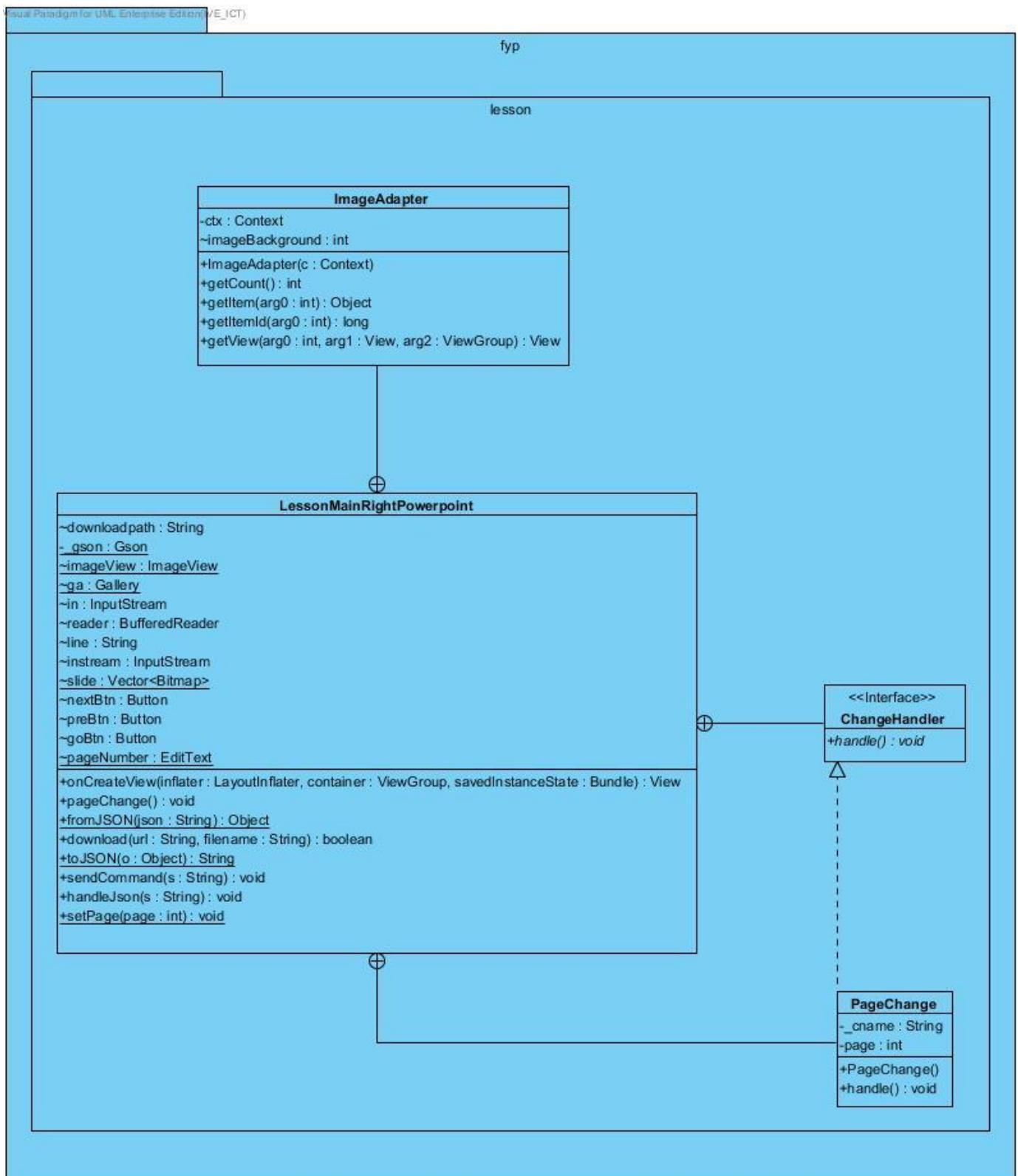
Documentation of problem analysis

- Entity Relationship Diagram
- Class Diagram
- Use Case Diagram
- Use Case Description
- Control Flow Diagram
- State Transition Diagram
- Sequence Diagram
- Object Collaboration Diagram
- Data Dictionary

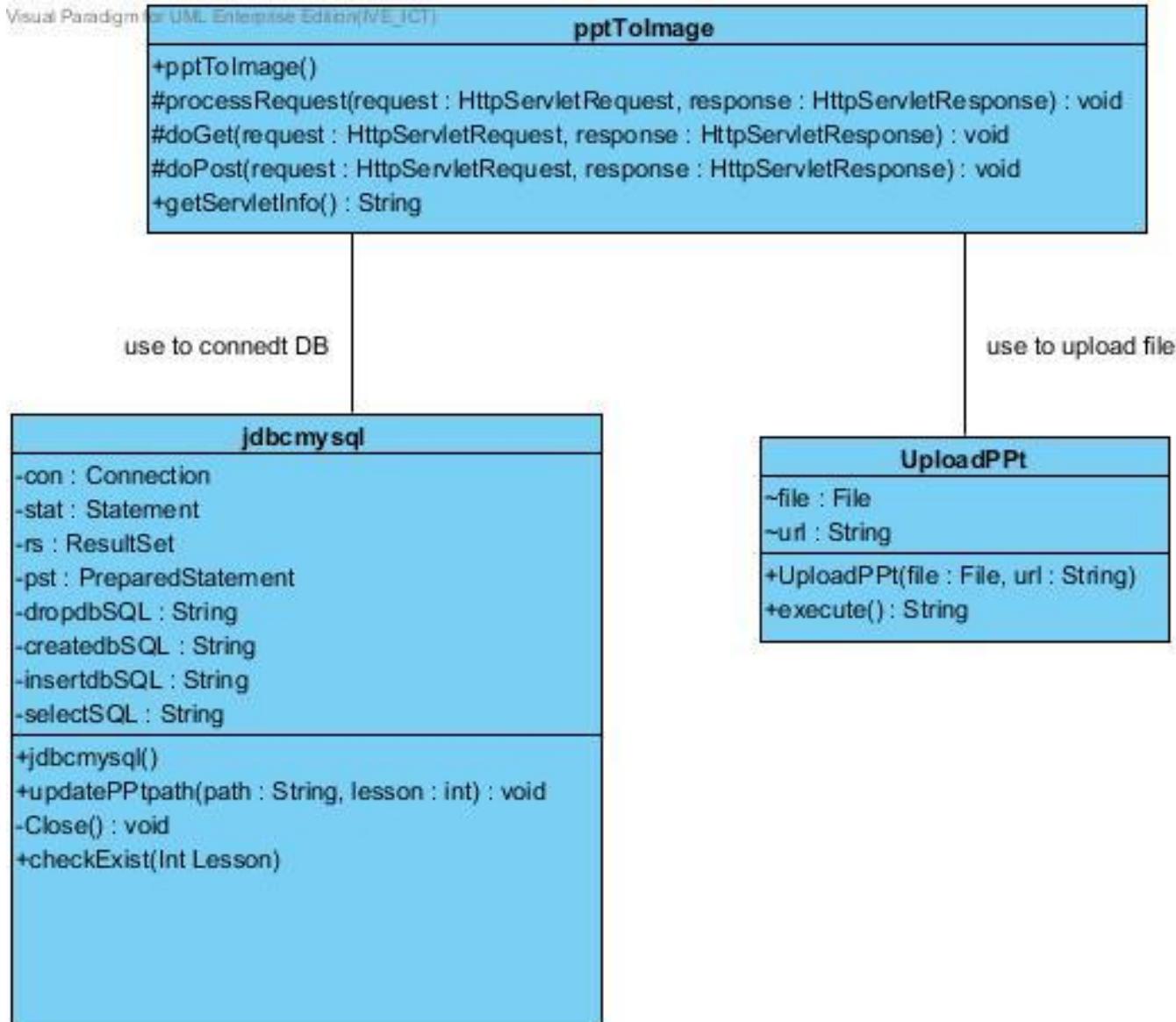
- Entity Relationship Diagram



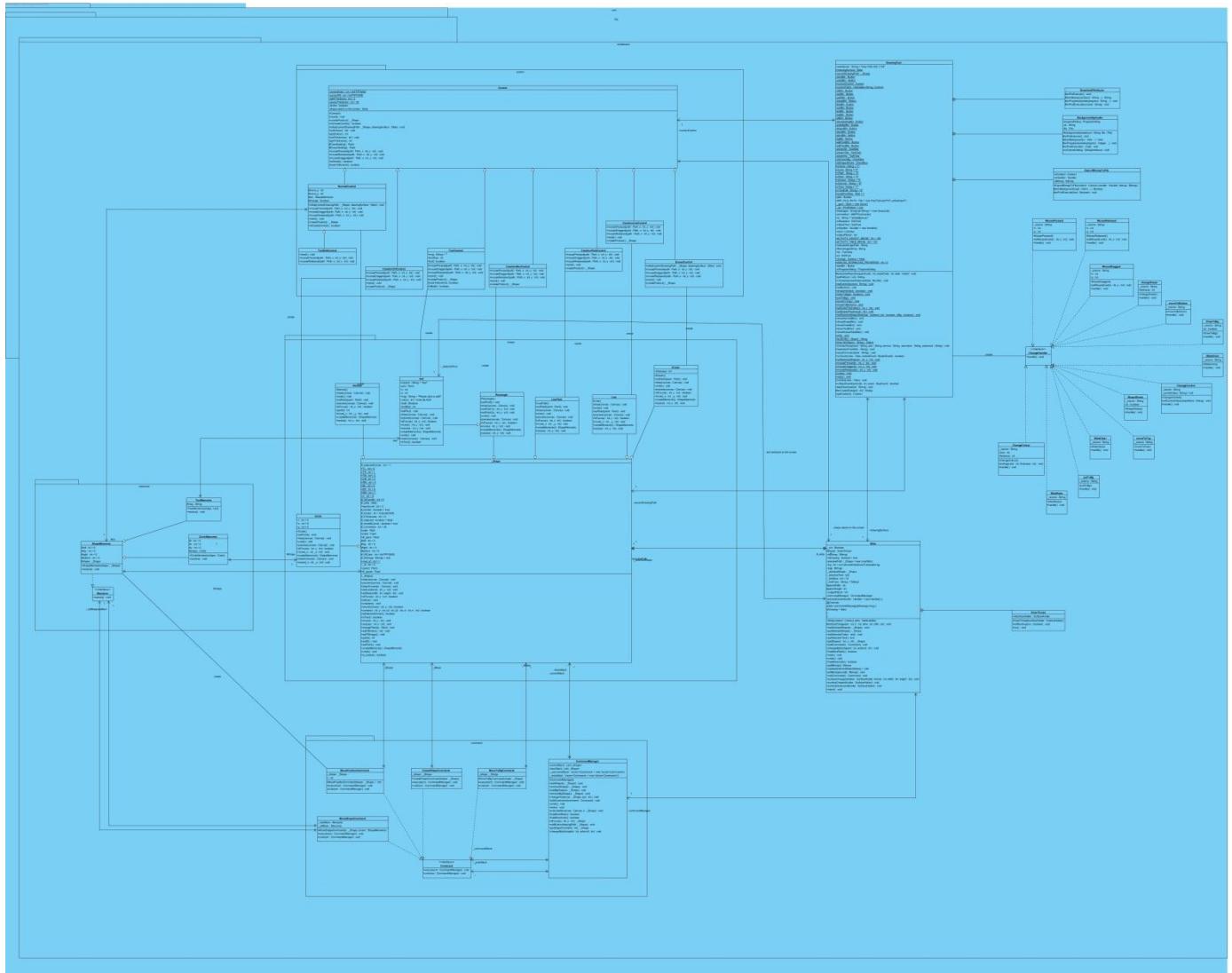
Class Diagram



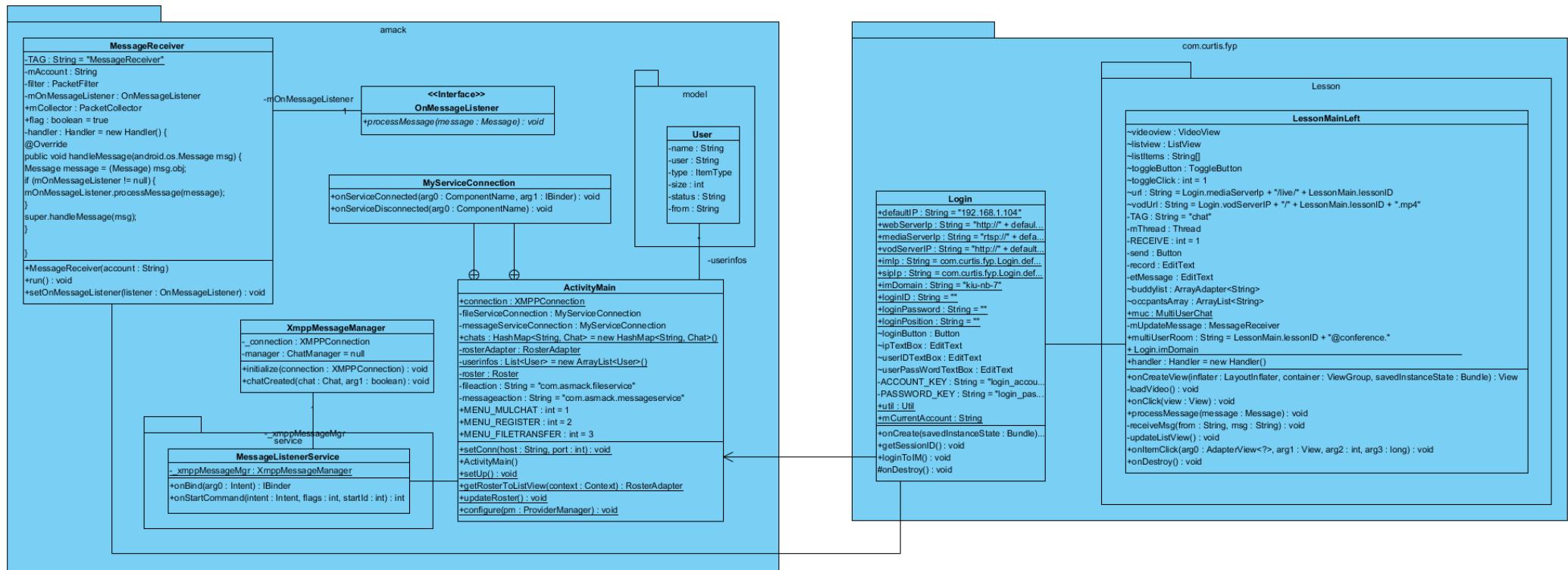
Powerpoint in Android



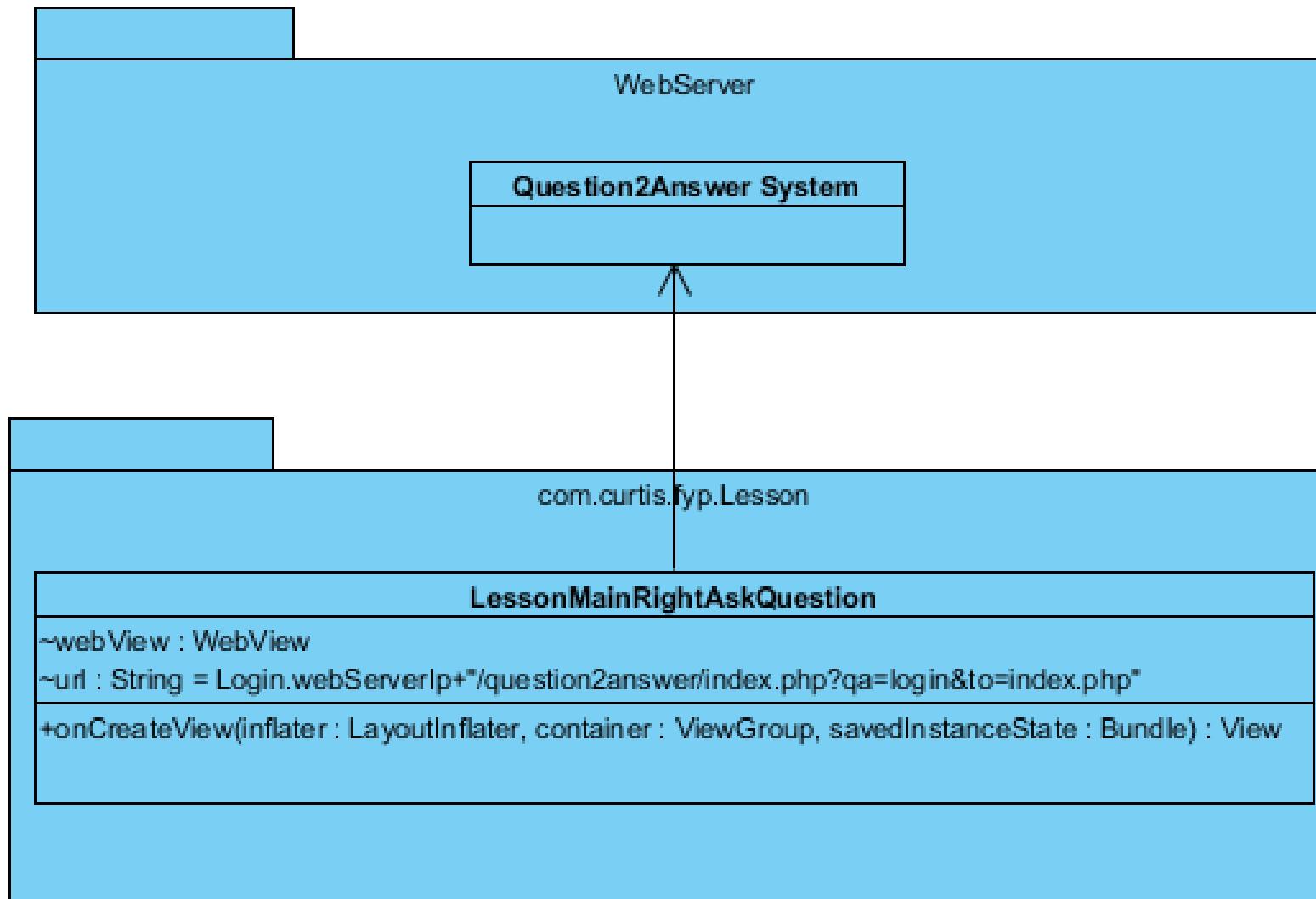
Powerpoint – Server



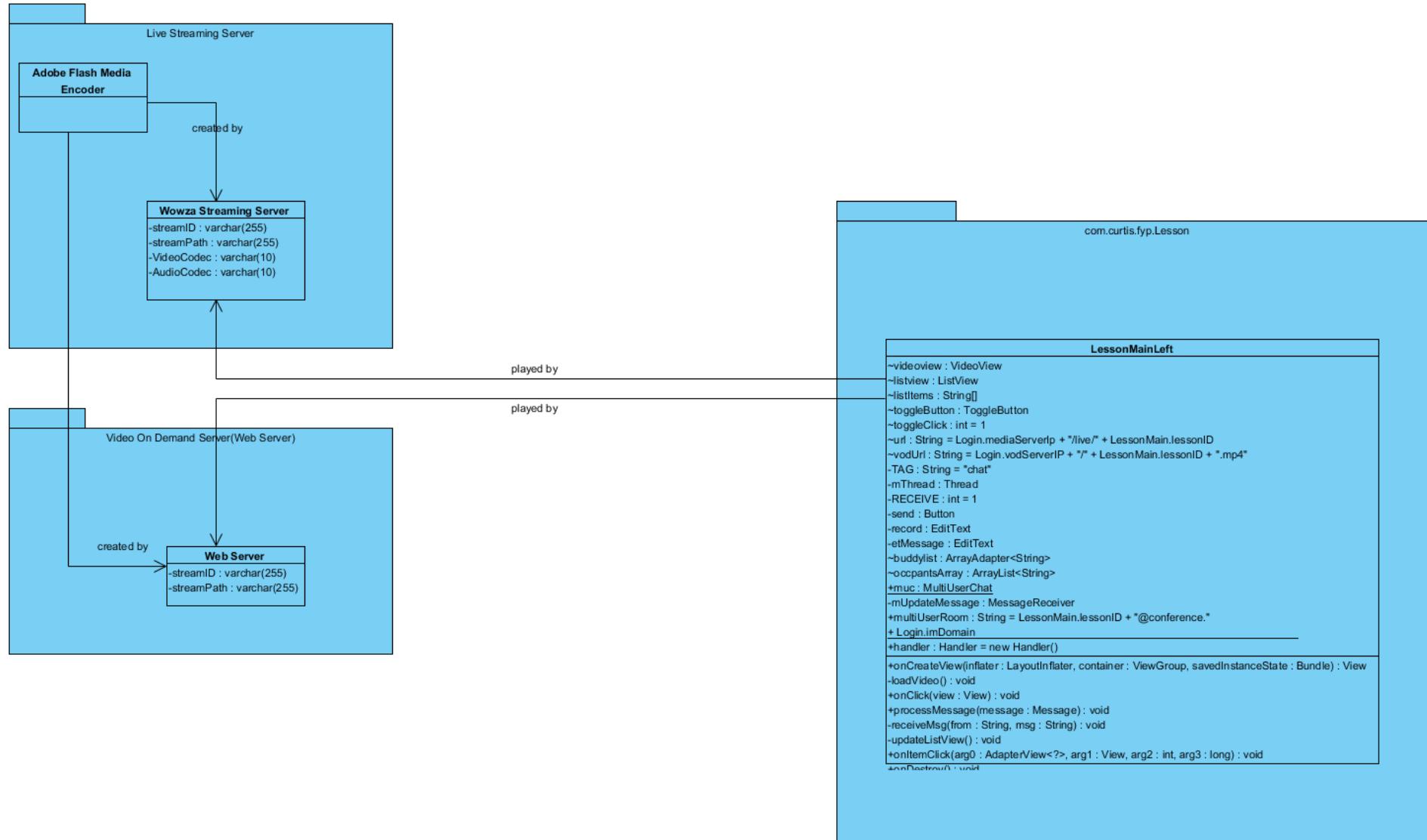
WhiteBoard



Instant Message

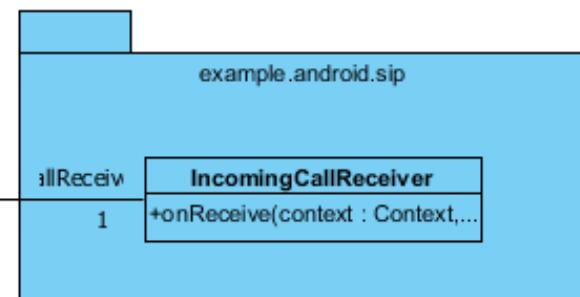


Question Bank

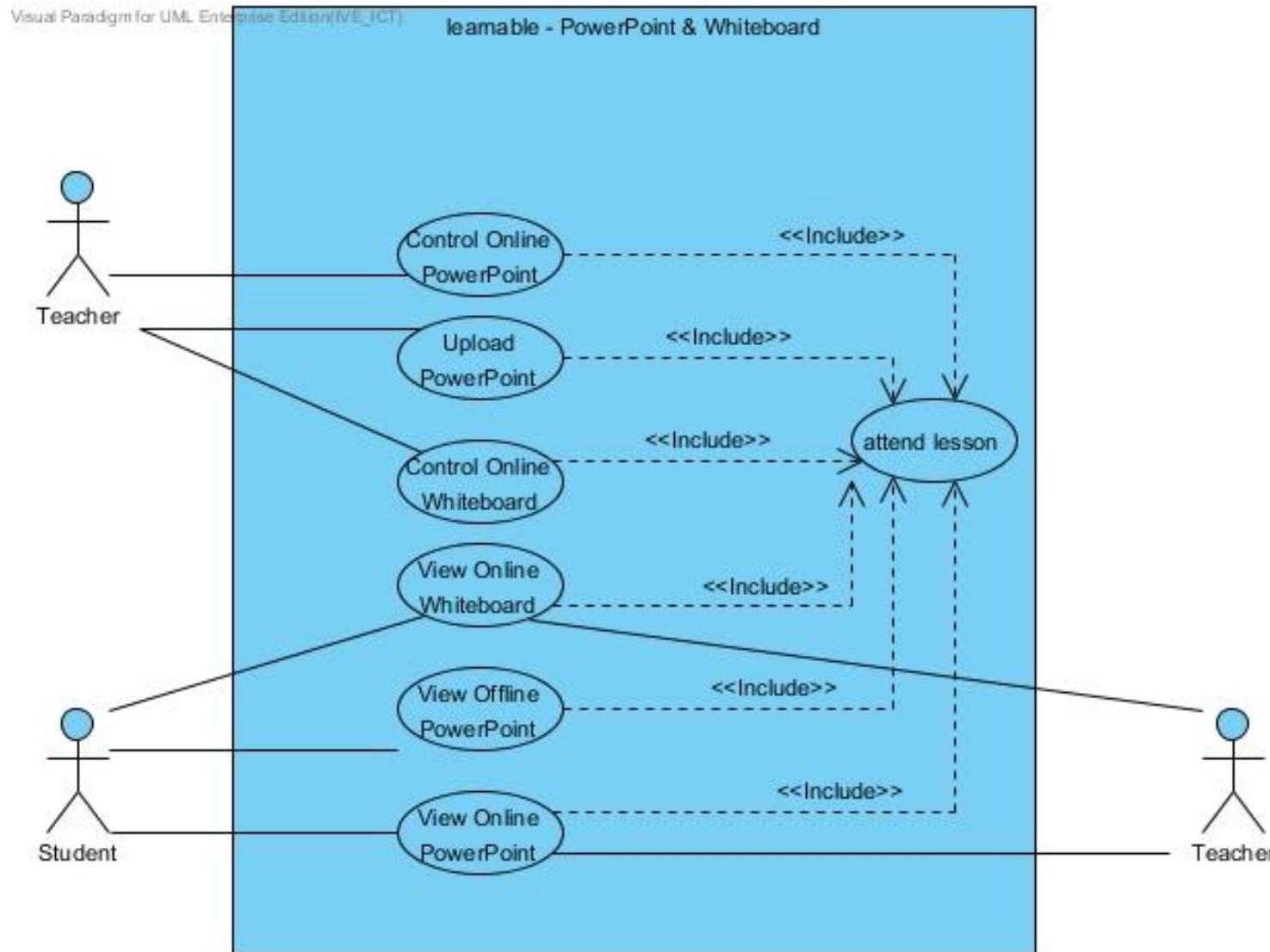


Video Streaming

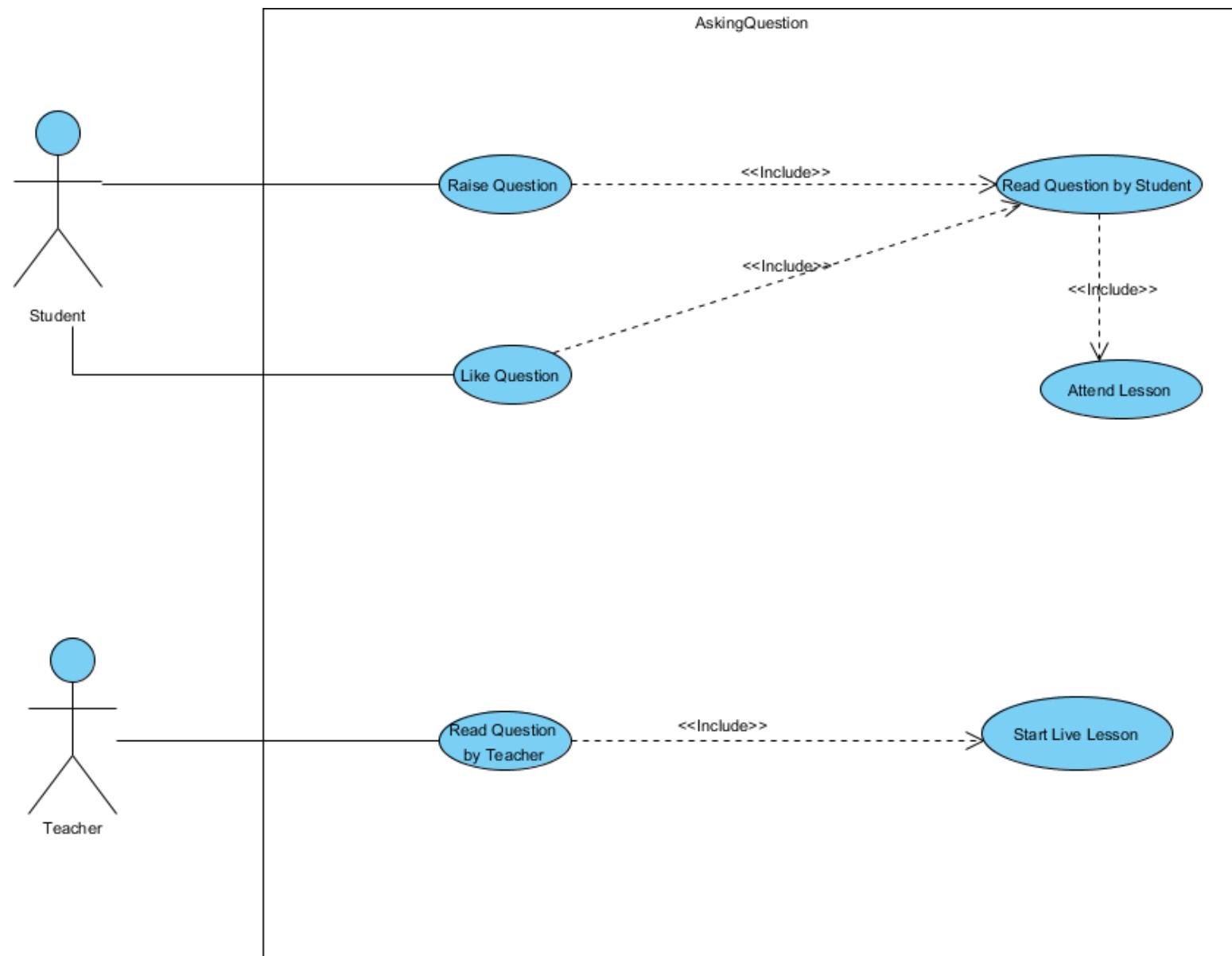
com.curtis.fyp.Lesson	
LessonMainRightChat	
~chat : Chat = null	
+sipAddress : String = null	
+manager : SipManager = null	
+me : SipProfile = null	
+call : SipAudioCall = null	
+callReceiver : IncomingCallReceiver	
-textMsg : EditText	
-inputMsg : EditText	
-sendButton : Button	
-labelView : TextView	
<u>-CALL_ADDRESS : int = 1</u>	
<u>-SET_AUTH_INFO : int = 2</u>	
<u>-UPDATE_SETTINGS_DIALOG : int = 3</u>	
<u>-HANG_UP : int = 4</u>	
+onCreateView(inflater : LayoutInflater, container : ViewGroup, savedInstanceState : Bundle) : View	
+onDestroy() : void	
+initializeManager() : void	
+initializeLocalProfile() : void	
+closeLocalProfile() : void	
+initiateCall() : void	
+updateStatus(status : String) : void	
+updateStatus(call : SipAudioCall) : void	
+onTouch(v : View, event : MotionEvent) : boolean	
+startByLessonMainLeft(callNumber : String, muc : MultiUserChat) : void	



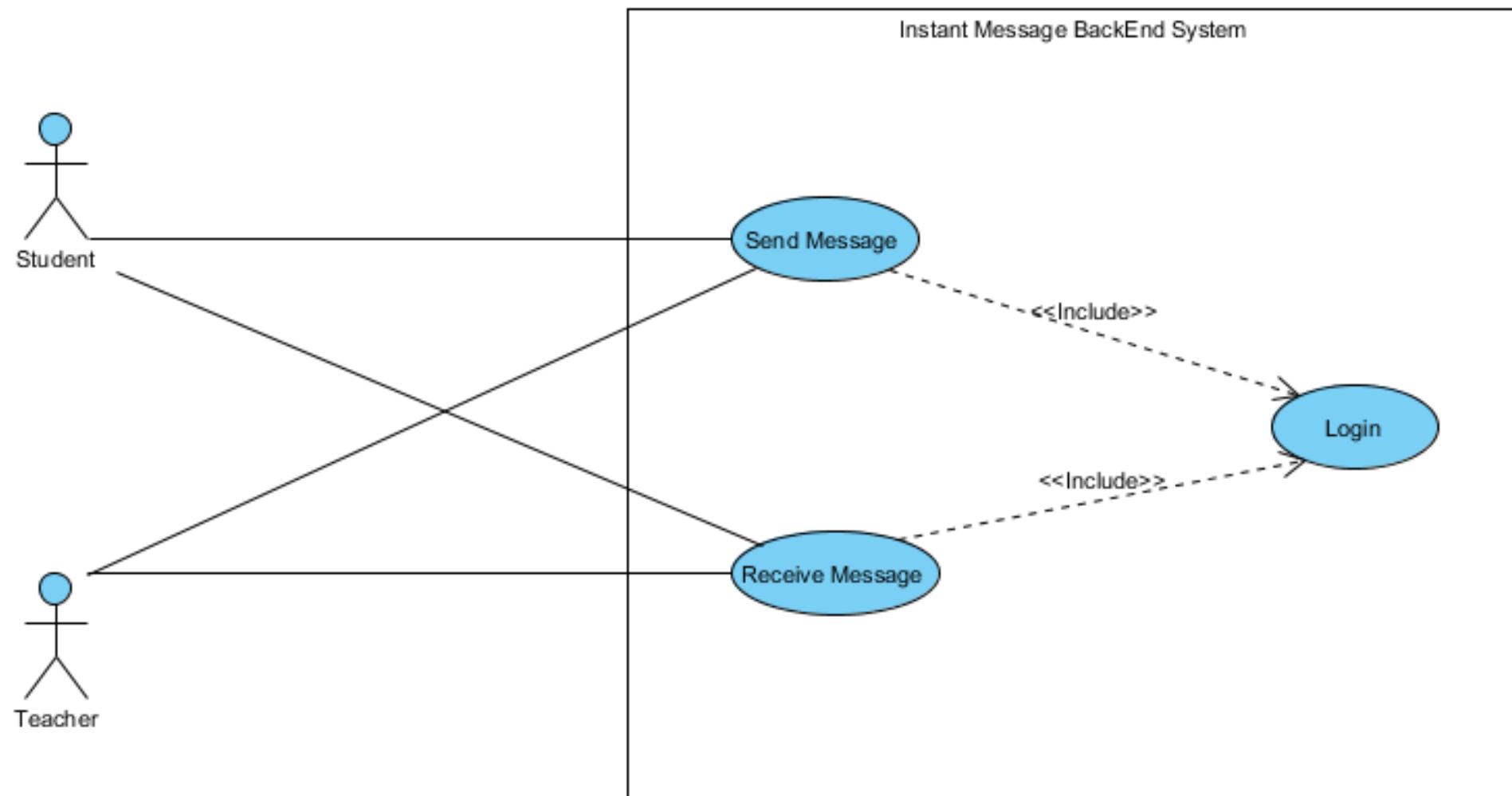
Voice Chat

Use Case Diagram

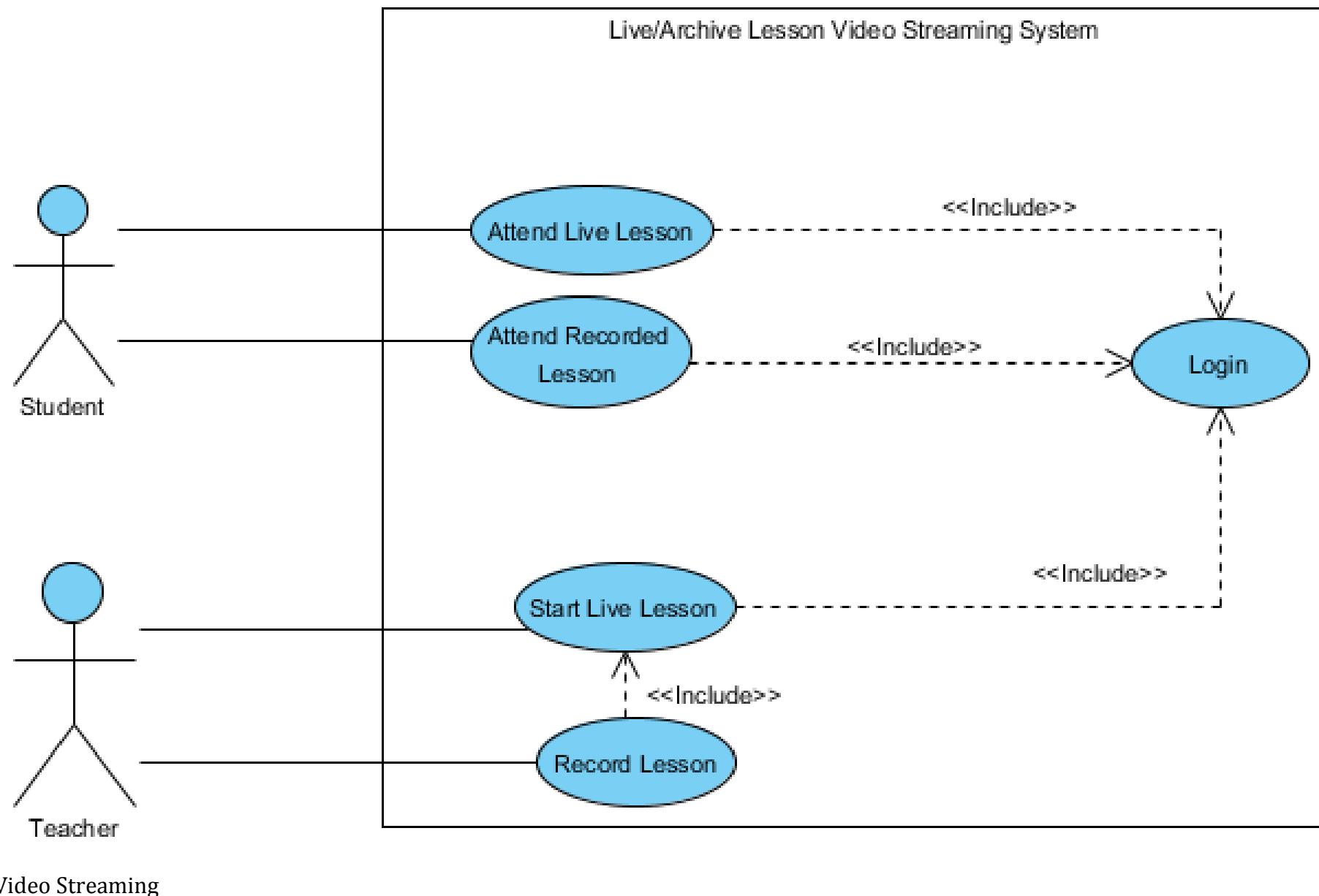
White Board and Powerpoint

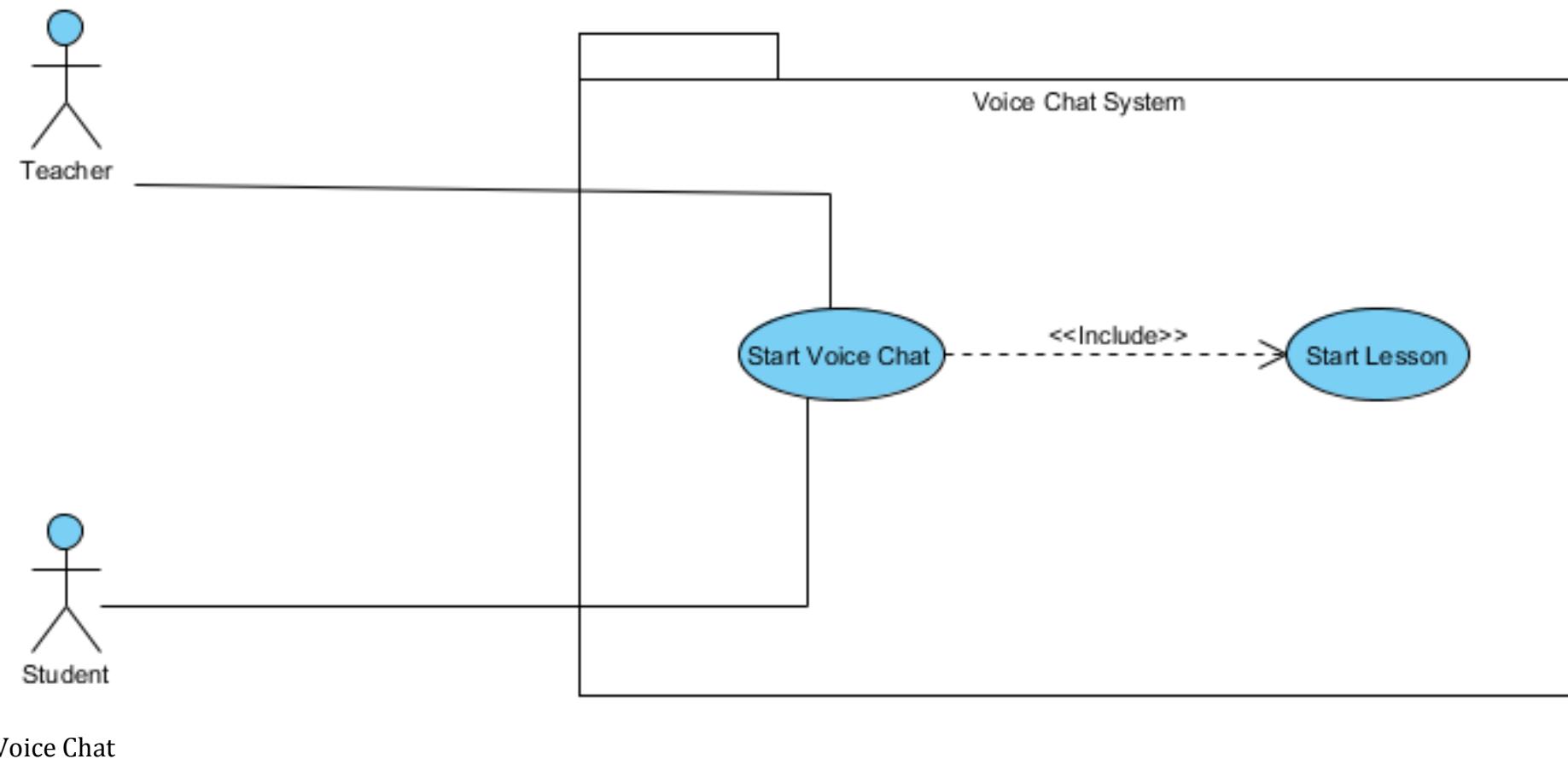


Ask Question



Instant Message





Use Case Description

Use Case: Attend live lesson
Use Case ID: UID-001
Actor: Student
Brief Description: Student attend a live lesson
Flow of Events: <ol style="list-style-type: none">1. Include(Login)2. Student first choose the lesson he or she need to attend.3. Lesson page will be shown with other function like white board/ PowerPoint / Question Bank etc. Live Streaming Box will show the current streaming video of the lesson.4. When lesson ended, streaming will stop, student can click exit to leave the page.5. Attendance will be counted after the lesson.
Pre-condition: Teacher has started the lesson so that the student can attend.
Post-condition: Attendance should be counted after attending the lesson.

Use Case: Attend recorded lesson
Use Case ID: UID-002
Actor: Student
Brief Description: Student attend an archive lesson
Flow of Events: <ol style="list-style-type: none">1. Include(Login)2. Student first choose the lesson he or she need to attend.3. Lesson page will be shown with other function like white board/ PowerPoint / Question Bank etc. Recorded Streaming Box will show the recorded streaming video of the lesson.4. When lesson ended, streaming will stop, student can click exit to leave the page.5. Attendance will be counted after the lesson.
Pre-condition: Teacher recorded the lesson so that the student can attend.
Post-condition: Attendance should be counted after attending the lesson.

Use Case: Start live lesson
Use Case ID: UID-003
Actor: Teacher
Brief Description: Teacher start a lesson
Flow of Events:
<u>Computer</u>
1. In computer connected with camera, Turn on Flash Media Encoder.
2. Enter the requirement information so that it can connect to the Wowza Streaming Server.
3. Click "Start Streaming"
<u>Android</u>
1. Include(Login)
2. Teacher first choose the lesson he or she need to start.
3. Lesson page will be shown with other function like white board/ PowerPoint / Question Bank etc.
4. Then, Video box in the tablet will show the streaming video created by the computer.
5. Next, Teacher click "Start Lesson" to allow student to attend the lesson.
6. At the end, Teacher clicks "End Lesson" to stop the lesson.
7. Attendance list will be shown after the lesson.
8. Also click "Stop Streaming" in the computer.
Precondition: He needs to click "Start Streaming" in the computer where the video camera linked.

Use Case: Record lesson
Use Case ID: UID-004
Actor: Teacher
Brief Description: Record a live lesson
Flow of Events: <ol style="list-style-type: none">1. Include(Start live lesson)2. After the lesson, Teacher can select record the lesson or not.3. If yes, video will be kept in the server. Student can attend recorded lesson.
Alternative Flows and Exceptions: <p>If Teacher click not record, video will be still kept in the server without notice and mark as unreadable.</p>
Precondition: Teacher ended a live lesson.

Use Case: Start voice Chat
Use Case ID: UID-005
Actor: Student, Teacher
Brief Description: Video chat with others
Flow of Events: <ol style="list-style-type: none">1. Send invitation to partners that you would like to make a voice chat.2. Voice send to Telephone server and invite the partner3. If your partner accepts, actor can listen to you voice..

Use Case: Send Message
Use Case ID: UID-006
Actor: Student, Teacher
Brief Description: Backend system sending command
Flow of Events: <ol style="list-style-type: none">1. Waiting other sub-system to send a command.2. Receive the command and then send it to another client that required.

Use Case: Receive Message
Use Case ID: UID-007
Actor: Student, Teacher
Brief Description: Backend system sending command
Flow of Events:
<ol style="list-style-type: none">1. Waiting others to send message to the client.2. System will filter out the tag and notify the require sub-system.

Use Case: Read Question by Student
Use Case ID: UID-008
Actor: Student
Brief Description: Student can read question in question bank.
Flow of Events:
<ol style="list-style-type: none">1. Include (Attend Lesson)2. Look into the question bank with lesson number.3. It will show the entire question in this lesson.

Use Case: Raise Question
Use Case ID: UID-009
Actor: Student
Brief Description: Student can raise a question.
Flow of Events: <ol style="list-style-type: none">1. Include(Read Question by Student)2. Student can input their question and click “Send”3. Then it will submit to the Server.

Use Case: Like Question
Use Case ID: UID-010
Actor: Student
Brief Description: More efficiency for teacher to answer a question that is common around Student.
Flow of Events: <ol style="list-style-type: none">1. Include(Read Question by Student)2. Click the one you would like to “like”3. Then it will submit to the Server.

Use Case: Read Question
Use Case ID: UID-011
Actor: Teacher
Brief Description: The teacher can look at the question list and answer them in front of the camera during the lesson.
Flow of Events: <ol style="list-style-type: none">1. Include (Start Live Lesson)2. Look into the question bank with lesson number.3. It will show the entire question in this lesson.

Use Case: View Online Whiteboard
Use Case ID: UID-012
Actor: Student
Brief Description: student view Online Whiteboard
Precondition: Teacher start the lesson
Flow of Event: <ol style="list-style-type: none">1. Include (Start Live Lesson)2. a list of available lesson would be shown.3. Student could select the lesson which he has permission.4. When teacher draw anything on his/her screen or modify the drawing (e.g. move shapes , redo , undo), student's whiteboard would show the same drawings.
Alternative Flows and Exceptions:

Use Case: Control Online Whiteboard
Use Case ID: UID-013
Actor: teacher
Brief Description: teacher control Online Whiteboard
Precondition:
Flow of Event: 1. Include (Start Live Lesson) 2. teacher could 2.1 draw something 2.2 modify the drawing(resize . move shape) 2.3 undo, redo the drawing 3. the drawing data would send to all students' device. 4. Student can see the same drawing at the same time. What is more,
Alternative Flows and Exceptions: Teacher could select the color, thickness and border only (for shape).

Use Case: view Online PowerPoint
Use Case ID: UID-014
Actor: Student
Brief Description: Student view Online PowerPoint
Precondition: Teacher start the lesson
Flow of Event: <ol style="list-style-type: none">1. Include (Start Live Lesson)2. According to the lesson, the PowerPoint description file, picture would be downloaded to students' device.3. When teacher control PowerPoint, student's PowerPoint slide would change according teacher action.
Alternative Flows and Exceptions:

Use Case: Control Online PowerPoint
Use Case ID: UID-015
Actor: teacher
Brief Description: teacher control Online PowerPoint
Precondition: upload PowerPoint to server
Flow of Event: 1. Include (Start Live Lesson) 2. According to the lesson, the PowerPoint description file, picture would be downloaded. 3. Teacher could 3.1 click "Next "to jump to next slide 3.2 click "Previous" to jump to previous slide 3.3 click the "preview picture " to the related slide 3.4 enter page number directly . 4. Student's PowerPoint slide would change according teacher action.
Alternative Flows and Exceptions: When teacher enter invalid page number , click "Next" in the last page or click "Previous" in the front page , no effort would be shown

Use Case: Upload PowerPoint

Use Case ID: UID-016

Actor: teacher

Brief Description:

teacher could upload the PowerPoint to server and Enter the Lesson id. And then, System could change the PowerPoint into image for the later lesson use.

Flow of Event:

1. Include<login>
2. Teacher could select PowerPoint to server and enter the Lesson id.
3. System could change the PowerPoint into image for the later lesson use.
4. System could show the PowerPoint image

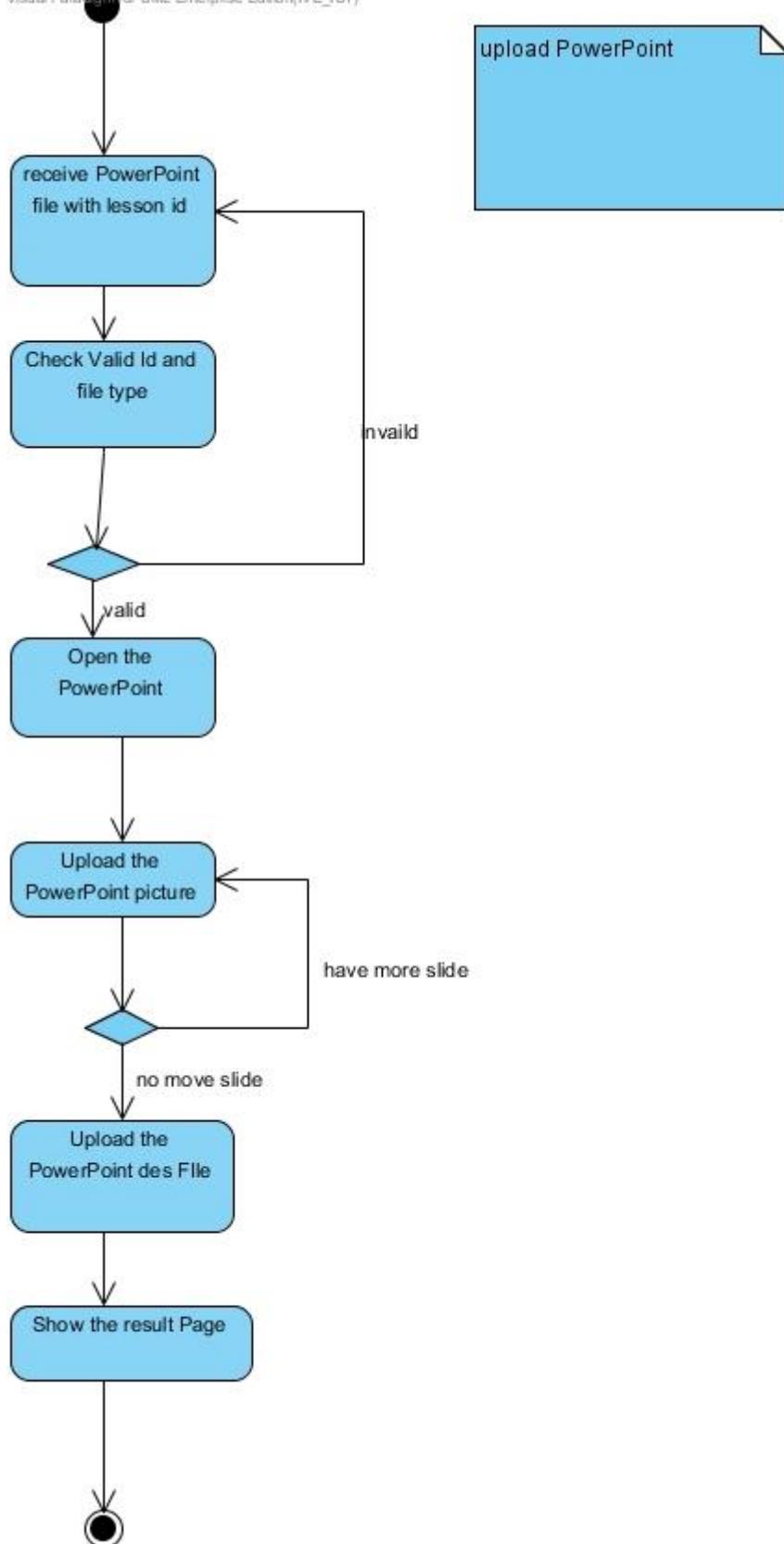
Alternative Flows and Exceptions:

If lesson id and file type are invalid, system could back to upload page.

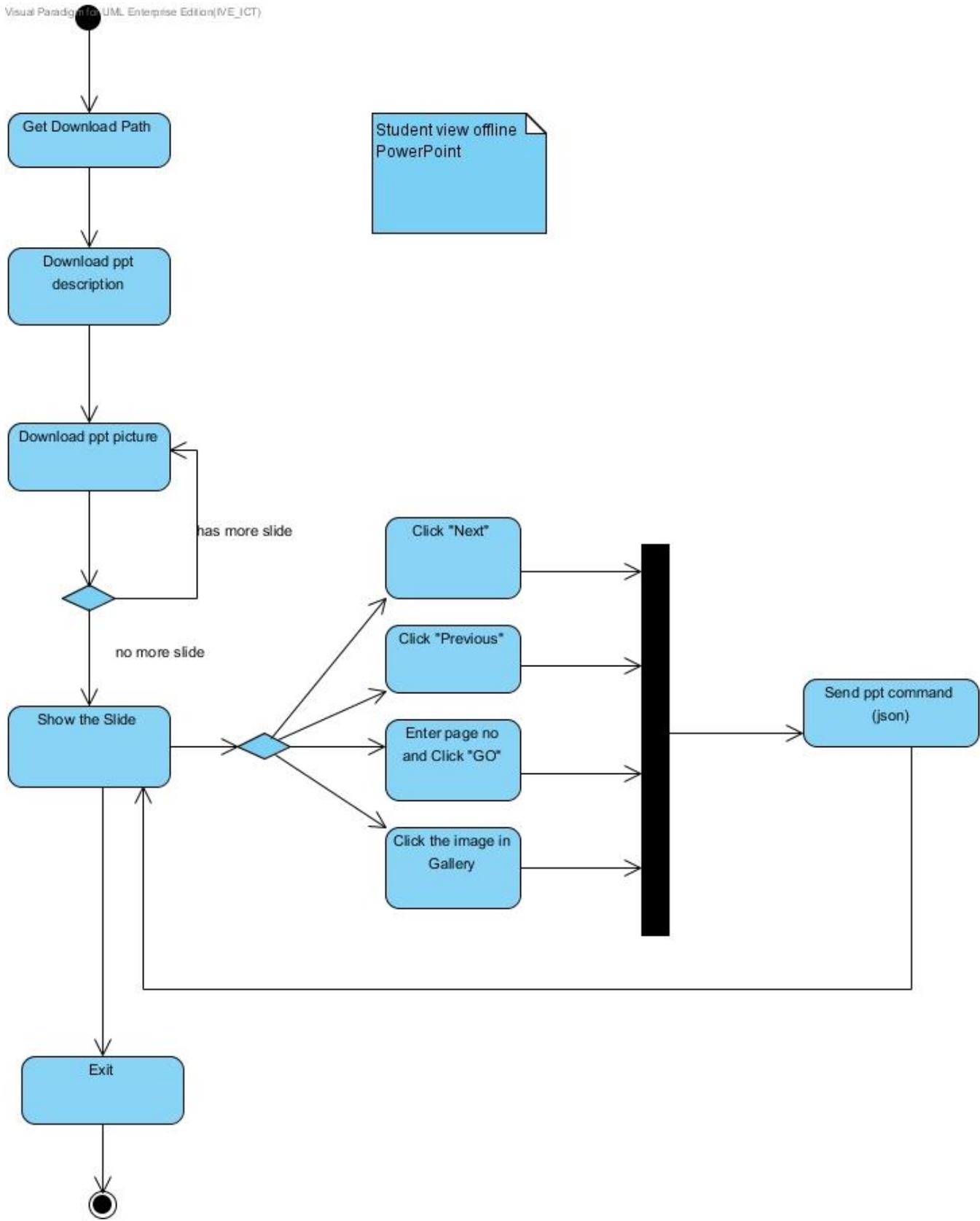
Use Case: View Offline PowerPoint
Use Case ID: UID-017
Actor: Student
Brief Description: Student View Offline PowerPoint
Flow of Event: <ol style="list-style-type: none">1. Include (Start Live Lesson)2. Student could select the lesson which he has permission.3. According to the choice, the PowerPoint description file, picture would be downloaded to students' device.4. Student could<ol style="list-style-type: none">4.1 click "Next "to jump to next slide4.2 "Previous" to jump to previous slide4.3 click the "preview picture " to the related slide4.4 enter page number directly .
Alternative Flows and Exceptions:

Control Flow Diagram

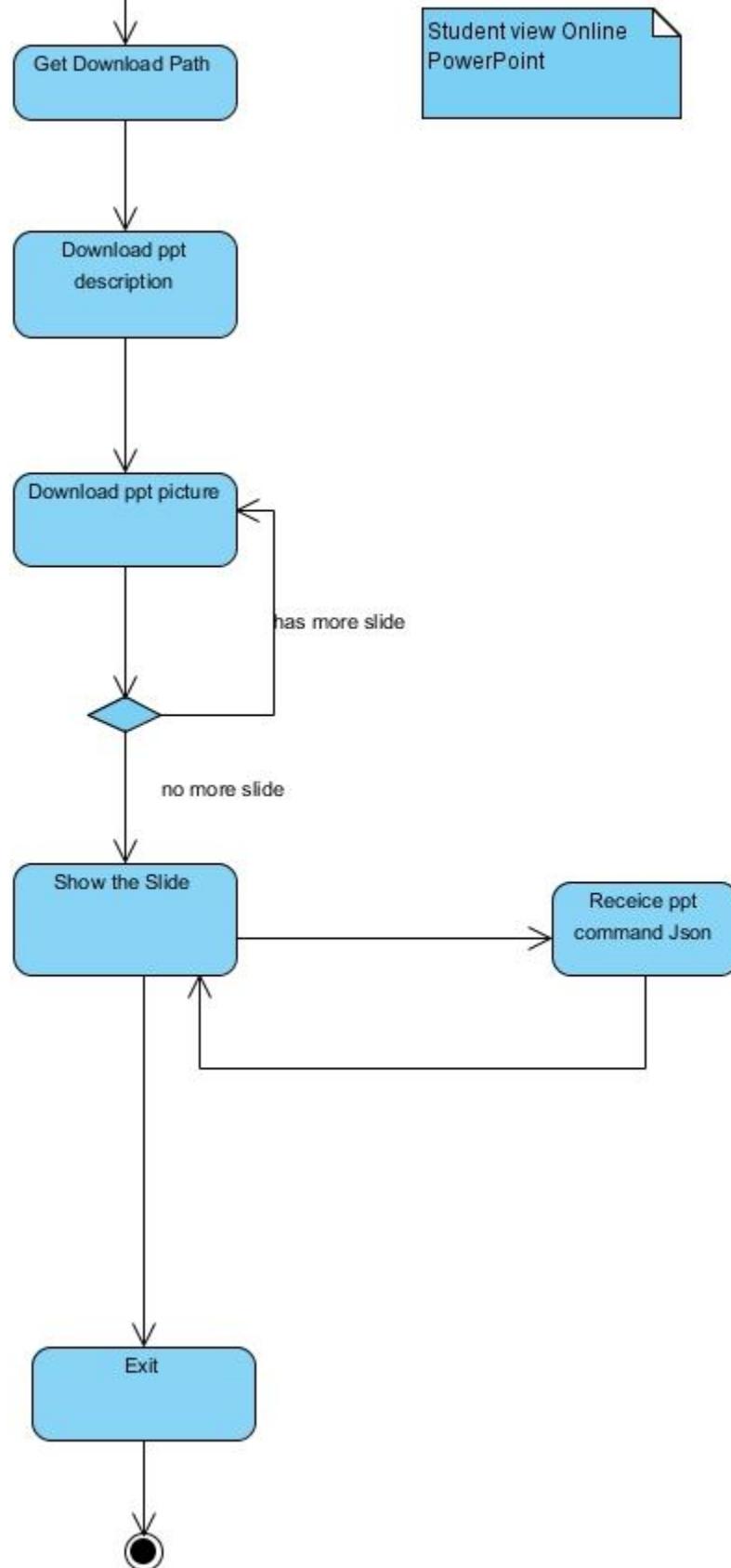
Visual Paradigm for UML Enterprise Edition(ME_ICT)



Upload PowerPoint



Teacher View online Powerpoint



Student View Online Powerpoint



Get Download Path

Download ppt
description

Download ppt picture

Student view offline
PowerPoint



has more slide

Click "Next"

Click "Previous"

Show the Slide

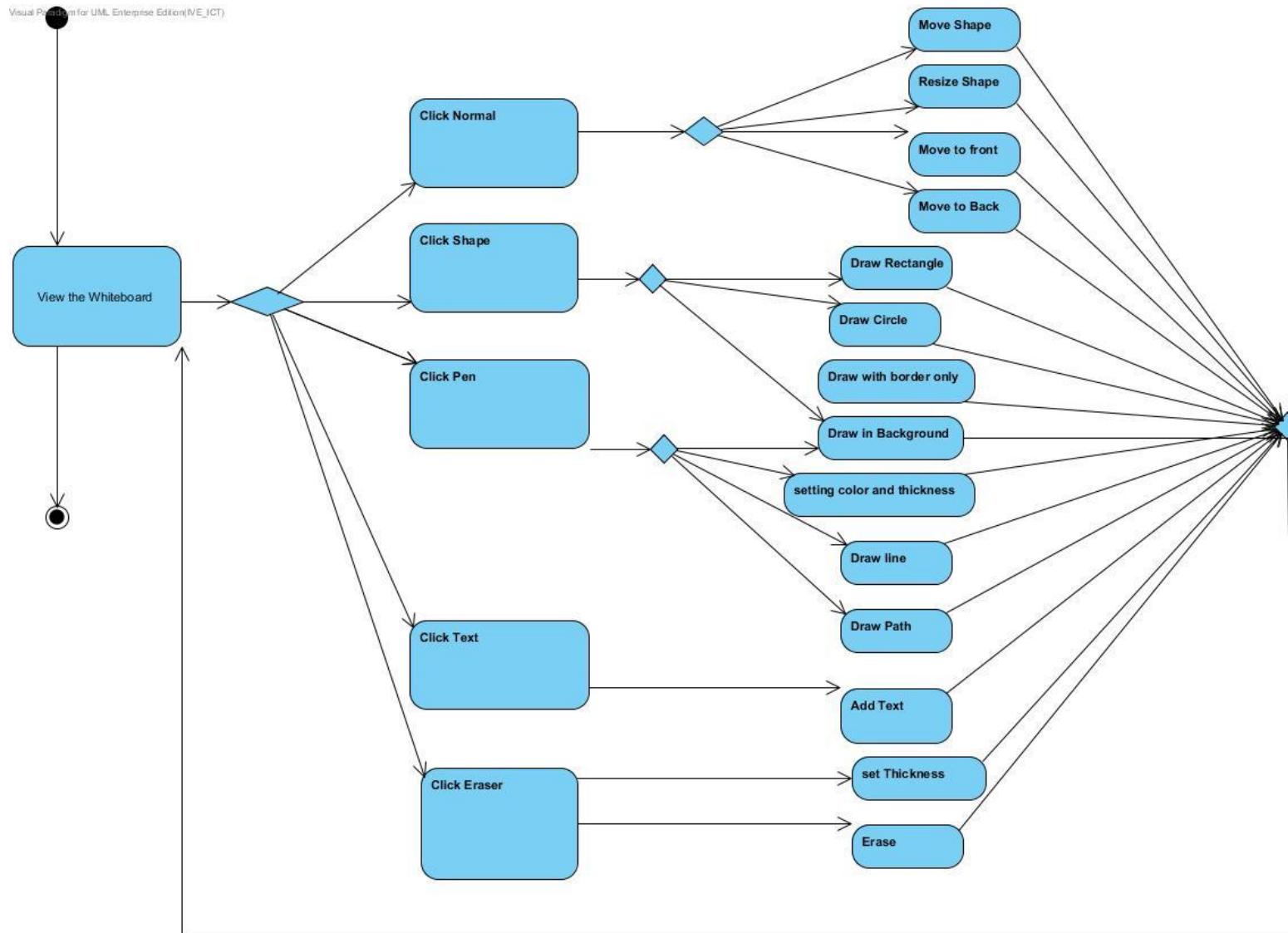
Enter page no
and Click "GO"

Click the image in
Gallery

no more slide

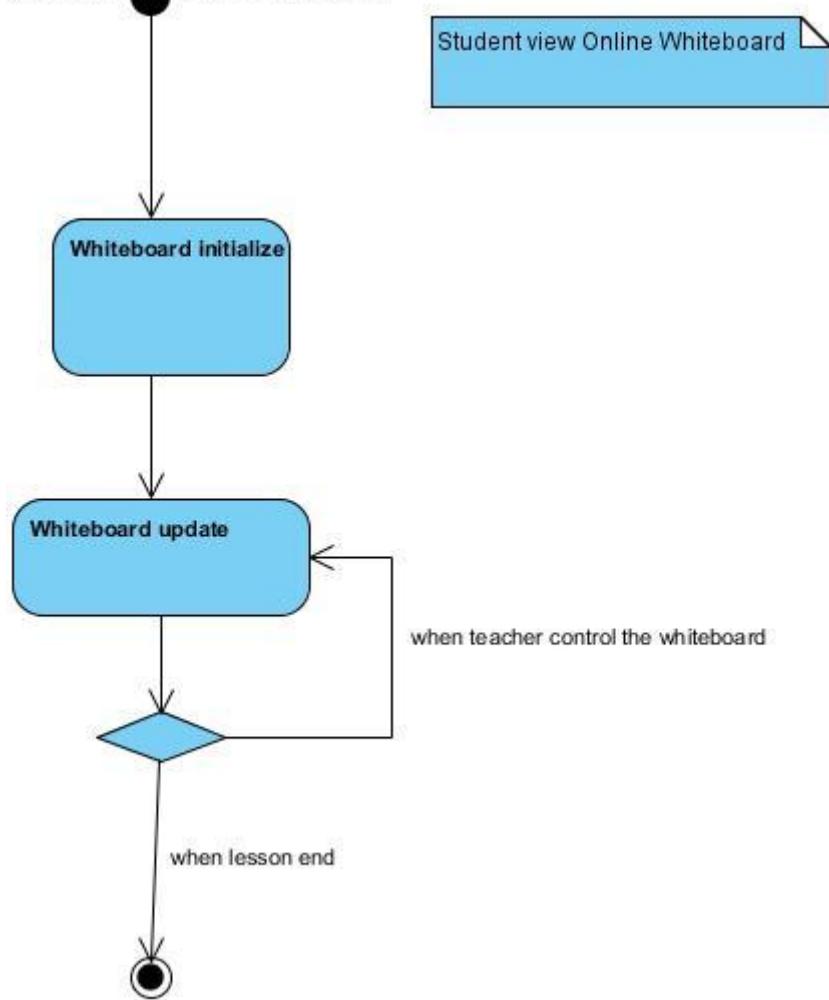
Exit

Student View Offline Powerpoint

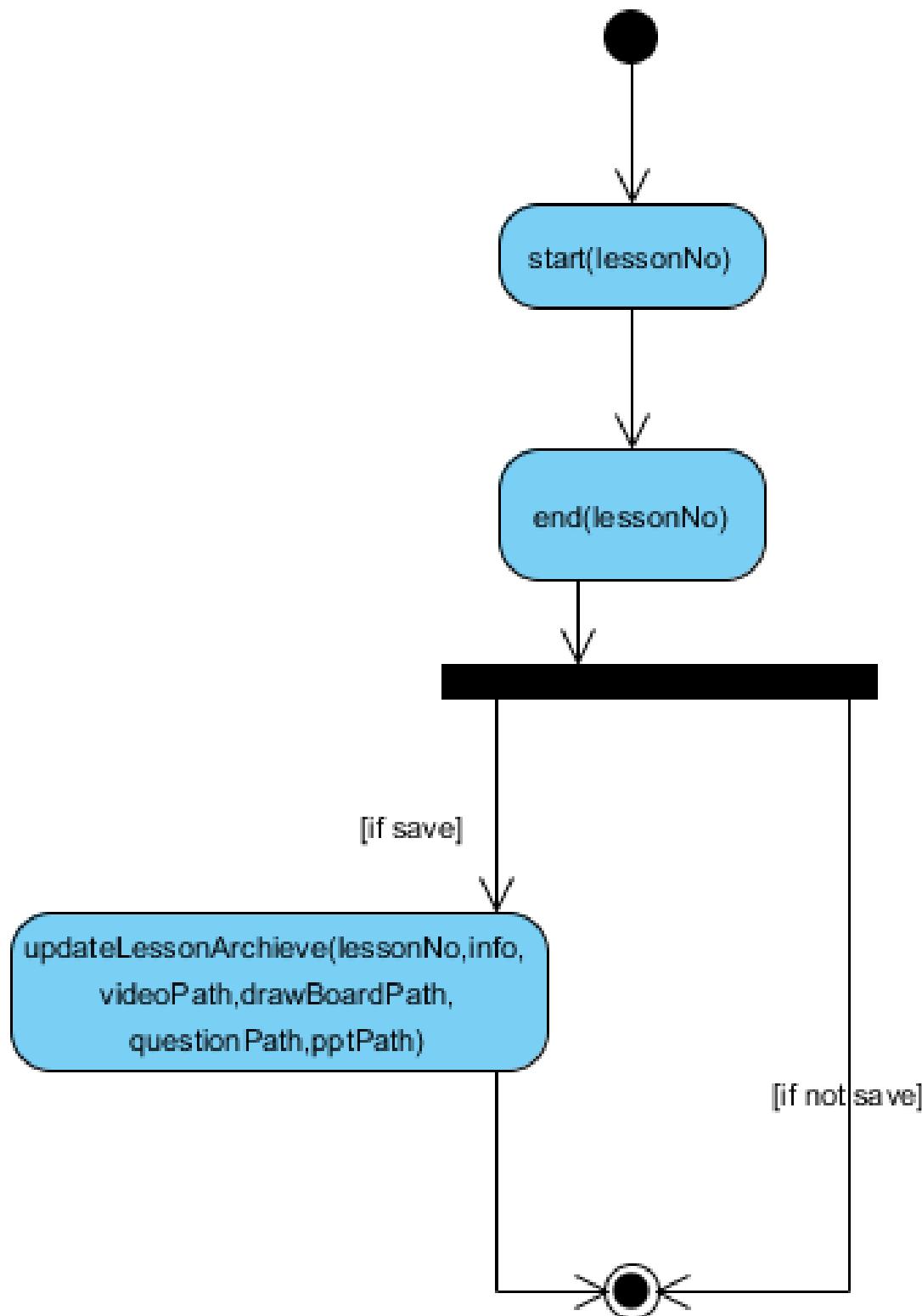


Teacher control whiteboard

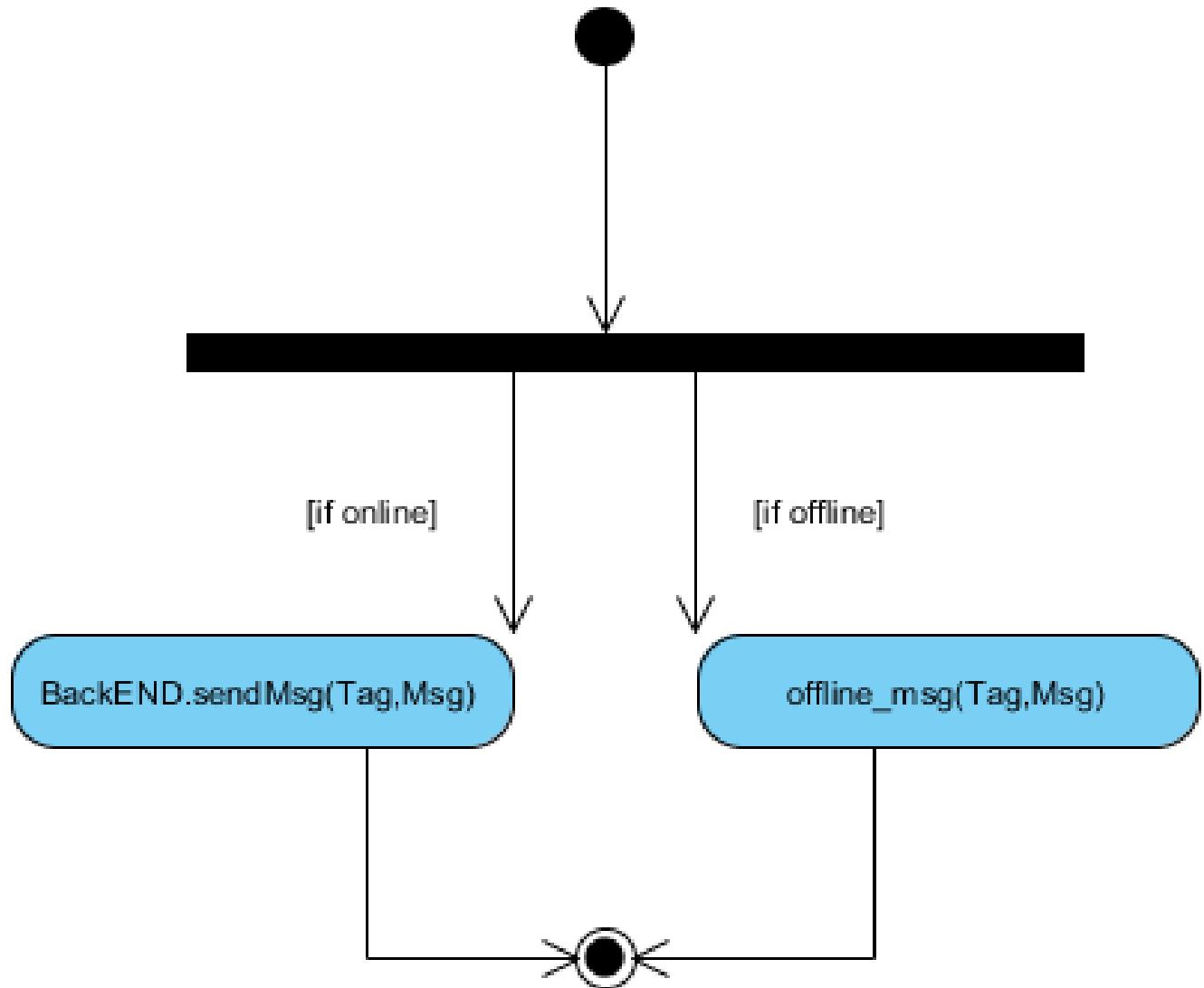
Visual Paradigm for UML Enterprise Edition(VE_ICT)



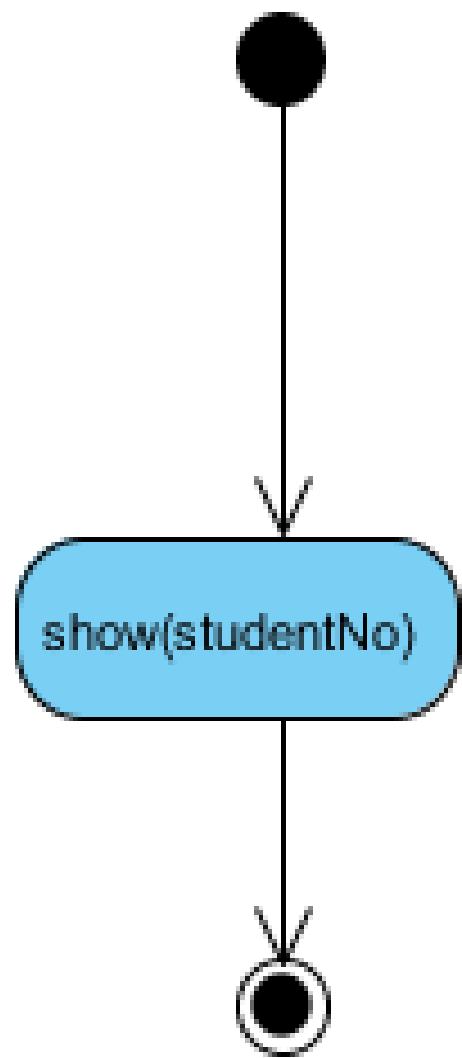
Student View Online White Board



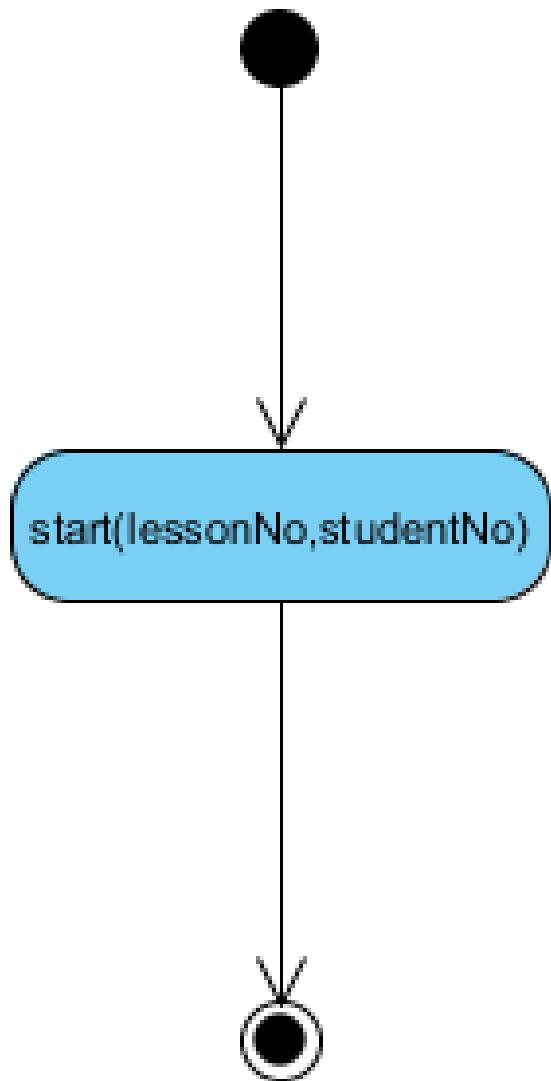
Broadcast Controller



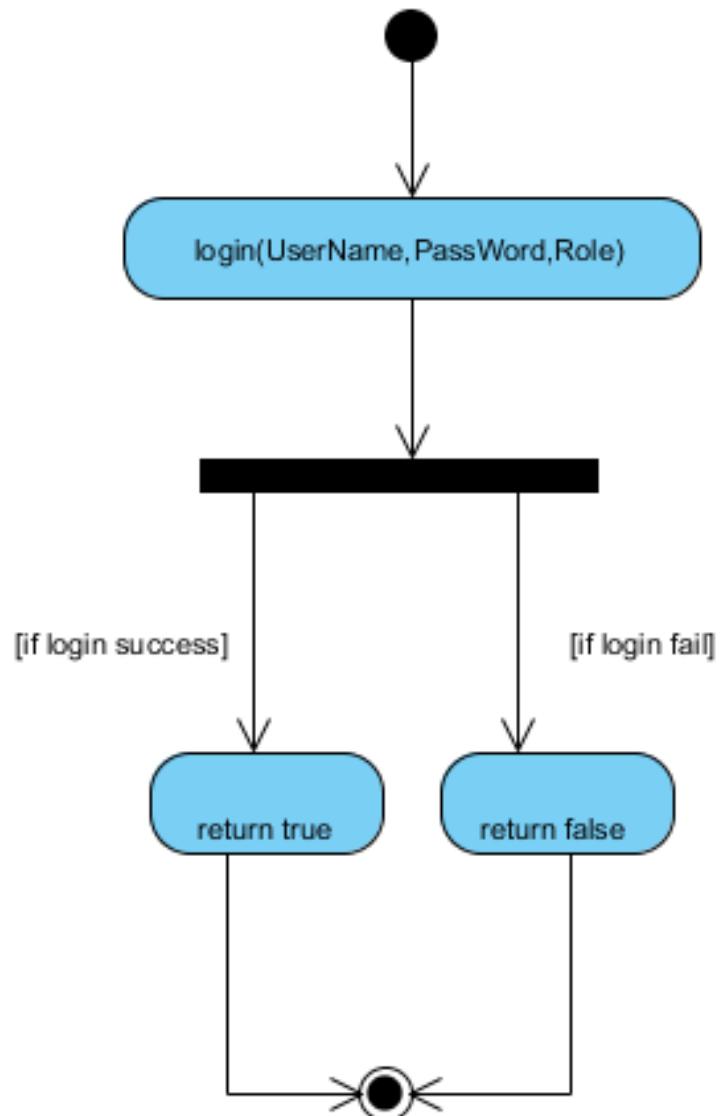
Instant Message Controller



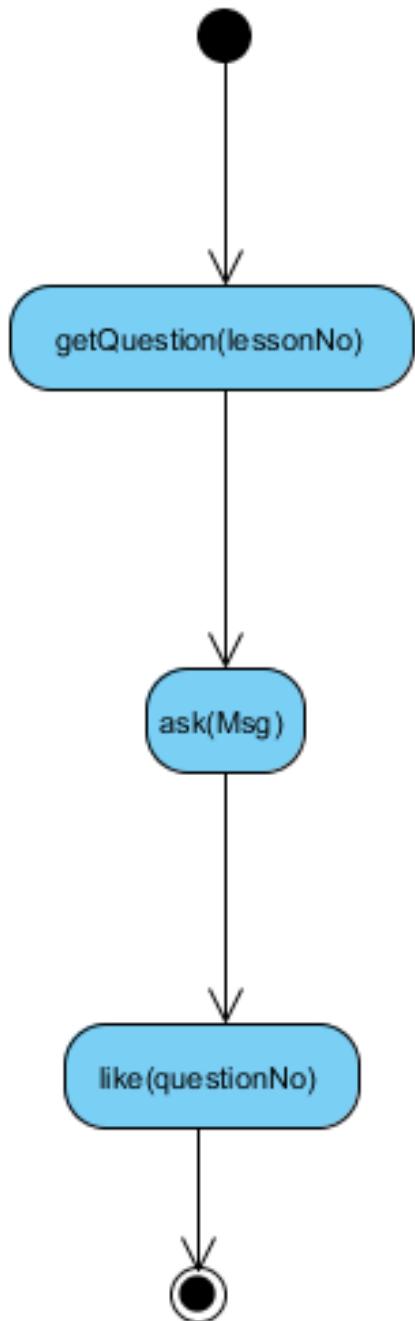
Lesson Page Controller



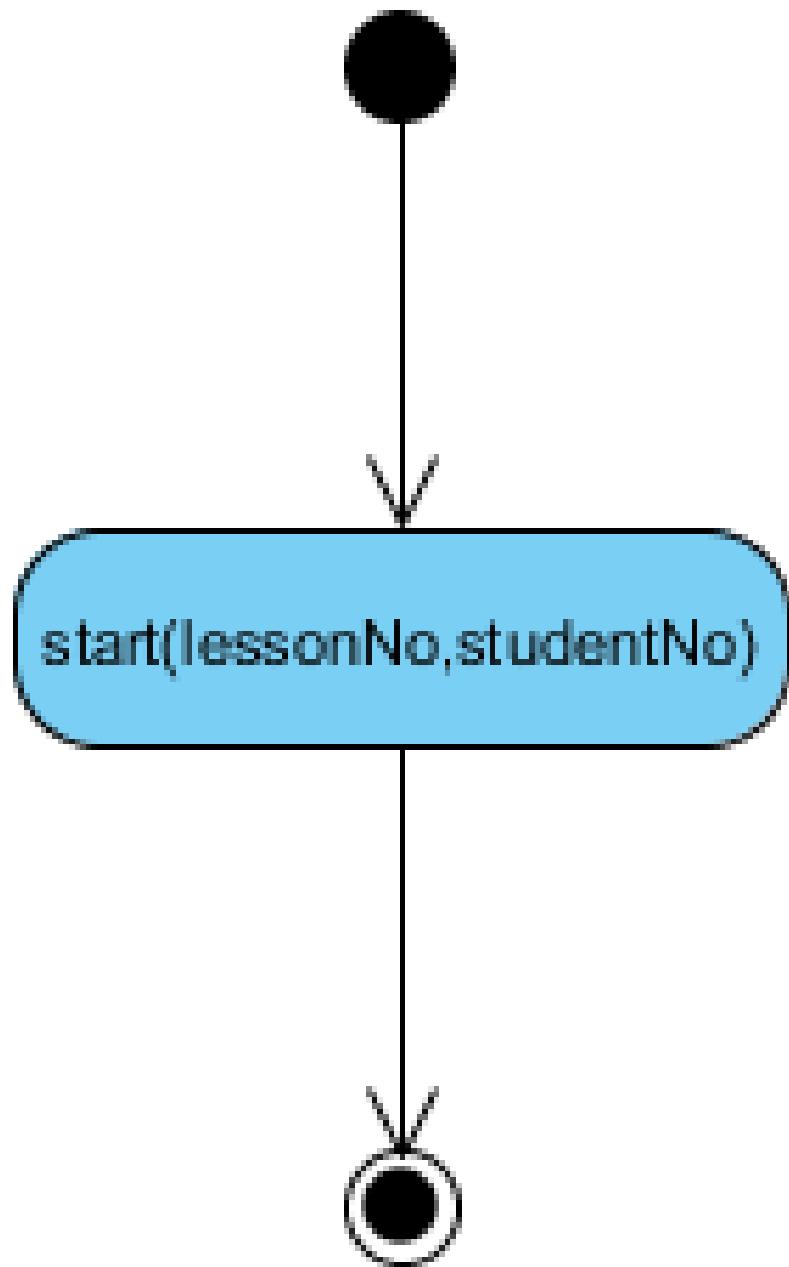
Live Lesson Controller



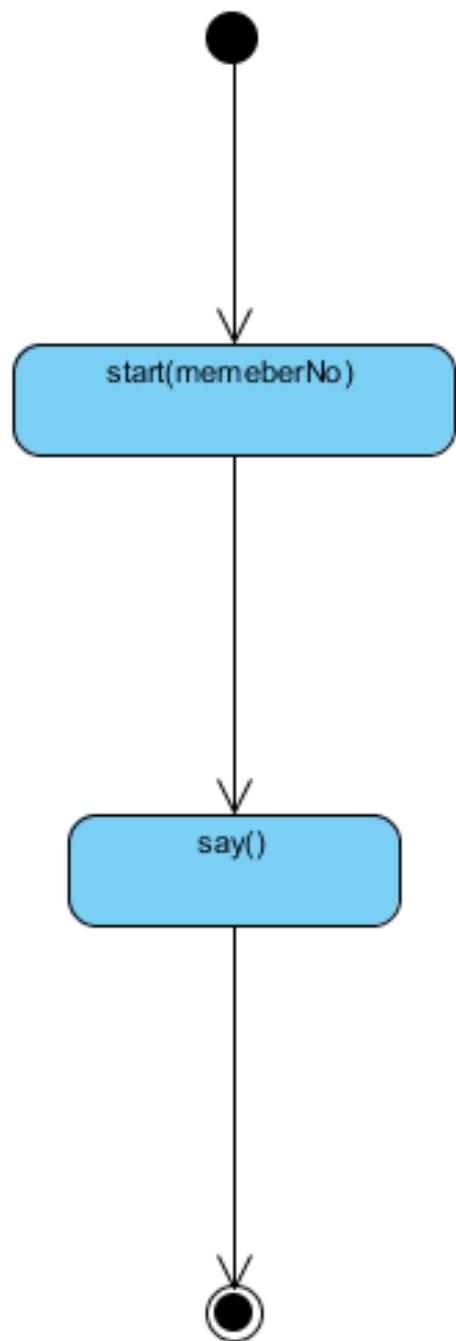
Login Controller



Question Bank Controller

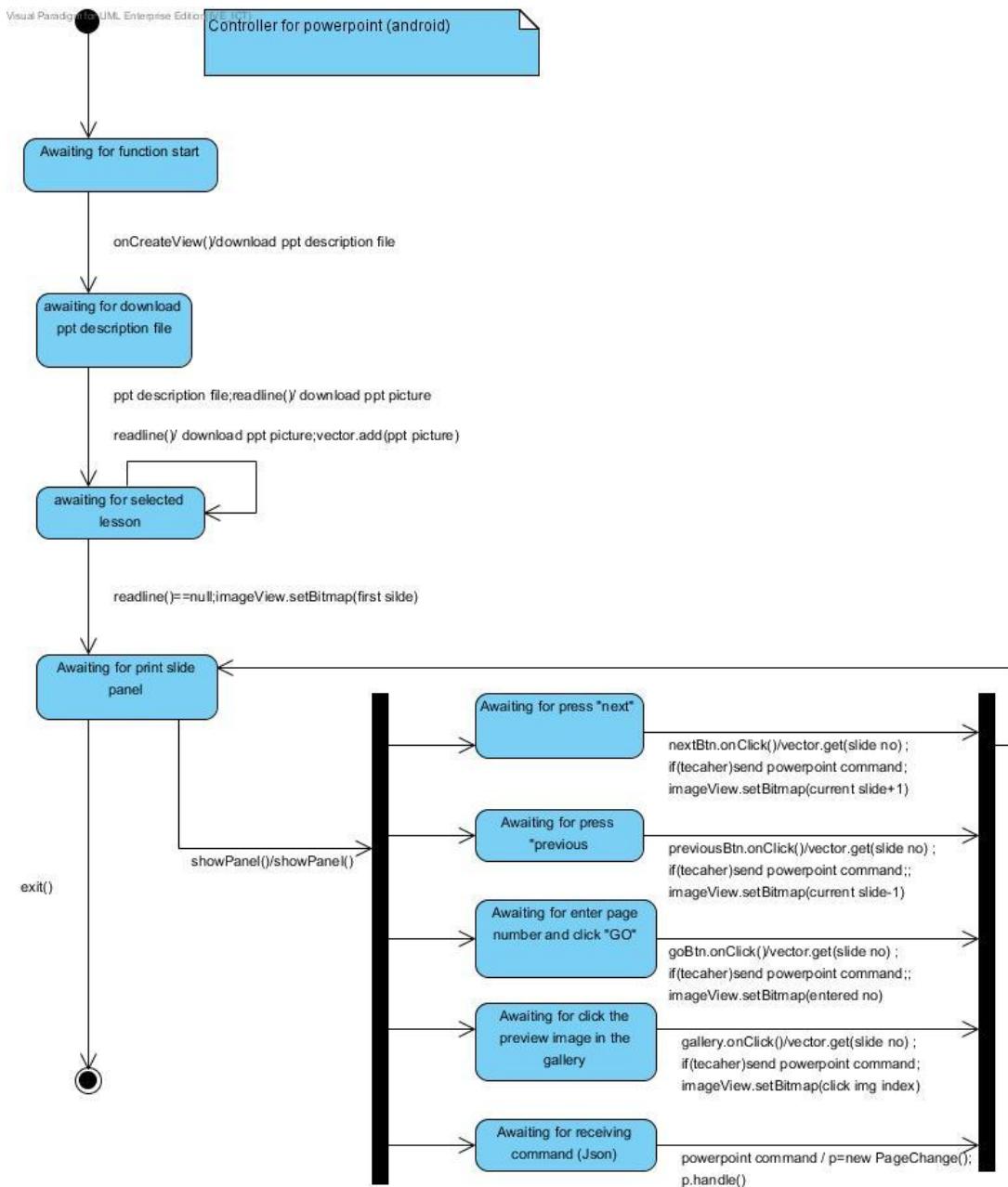


Record Lesson Controller



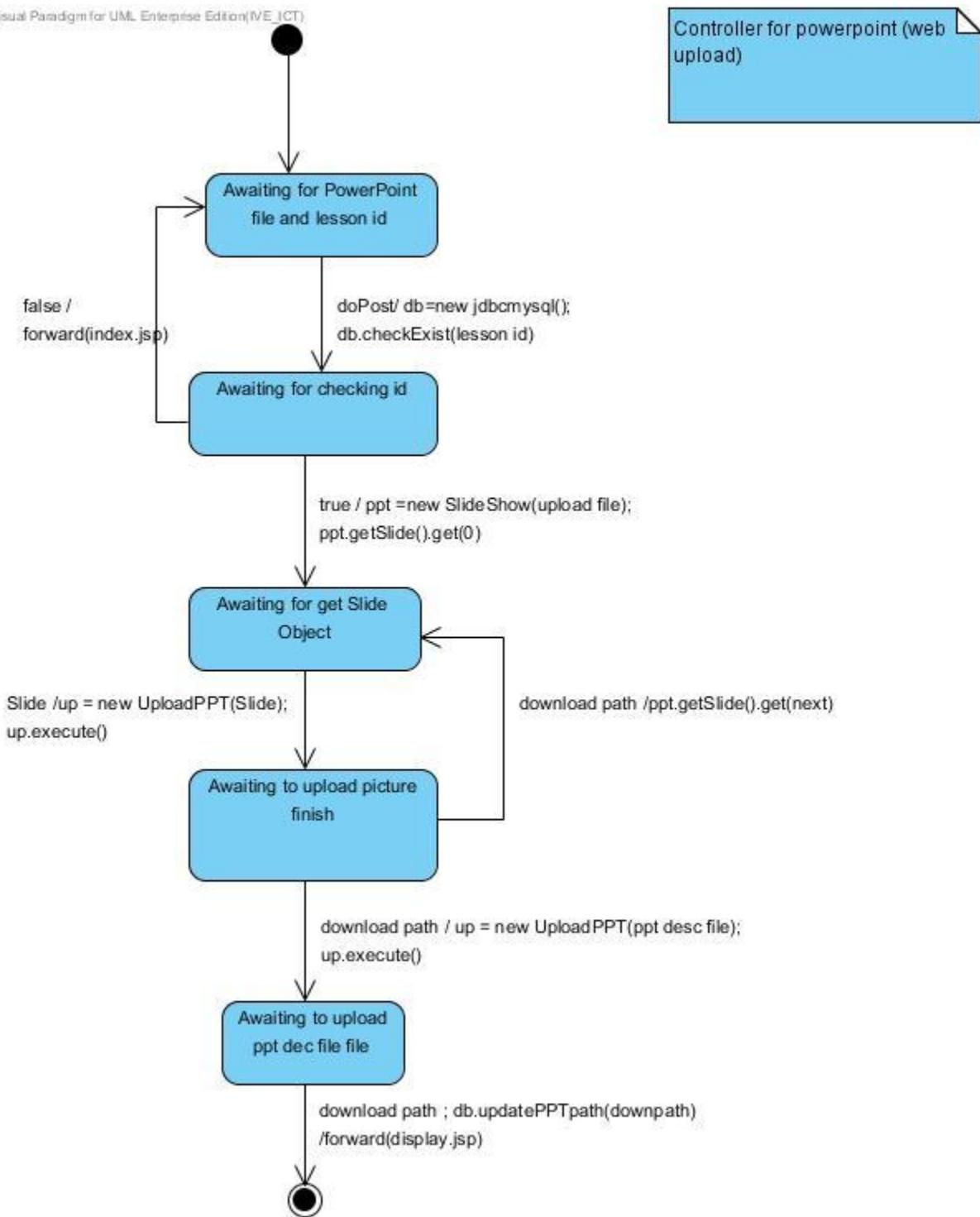
Voice Chat Controller

State Transition Diagram

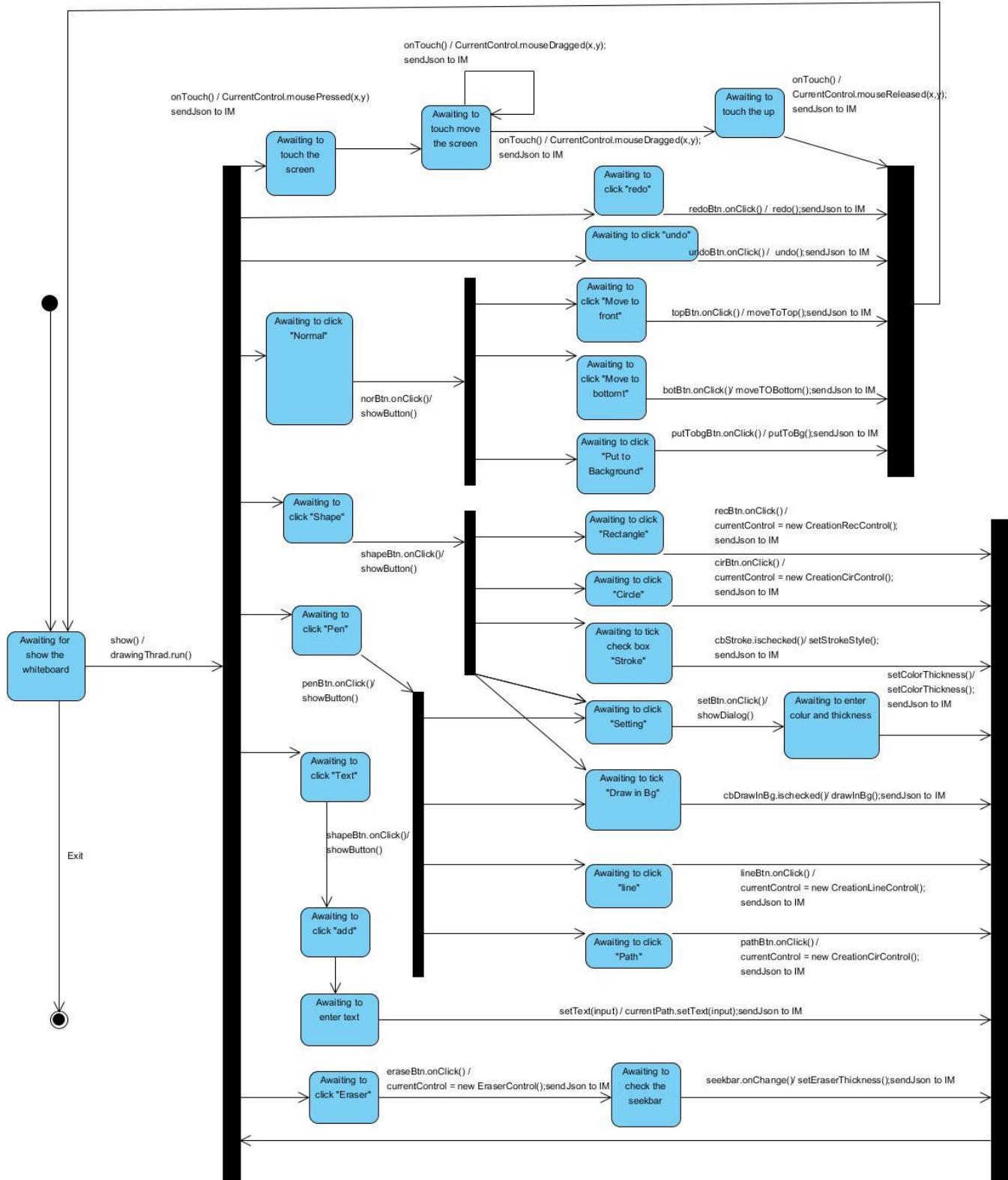
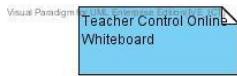


Powerpoint - Android

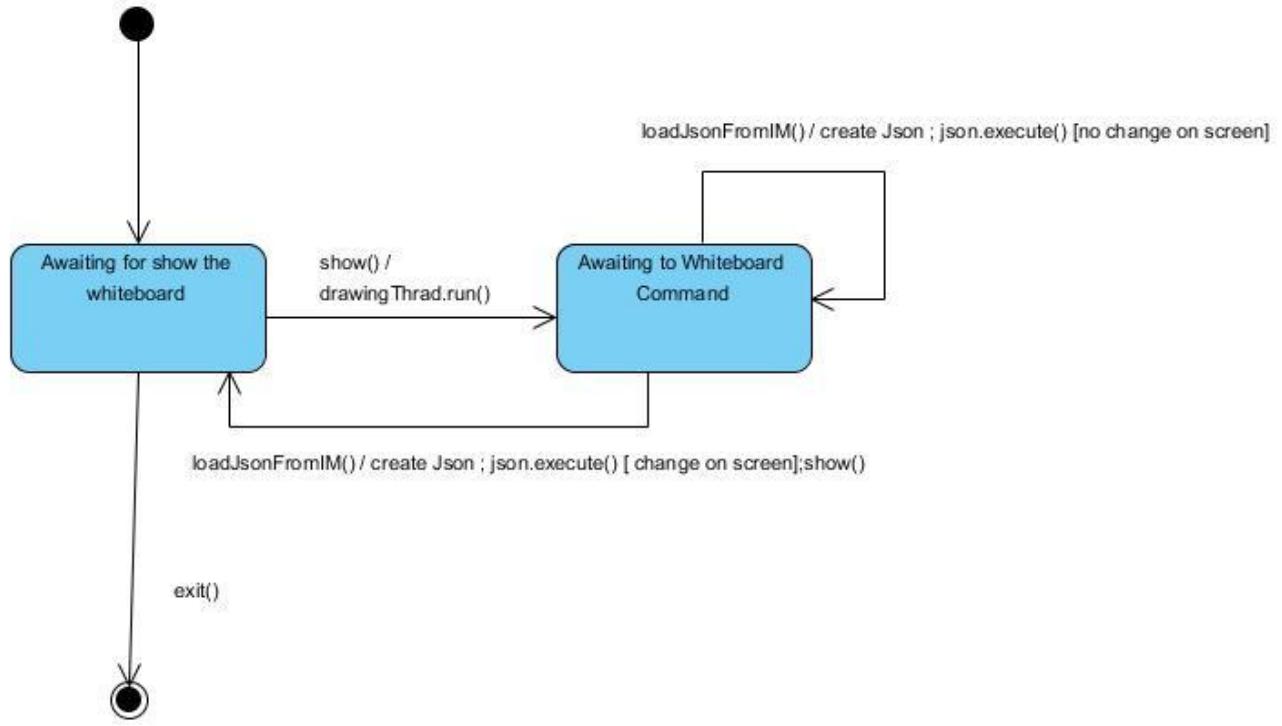
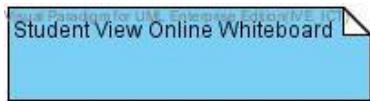
Visual Paradigm for UML Enterprise Edition(IV_E_ICT)



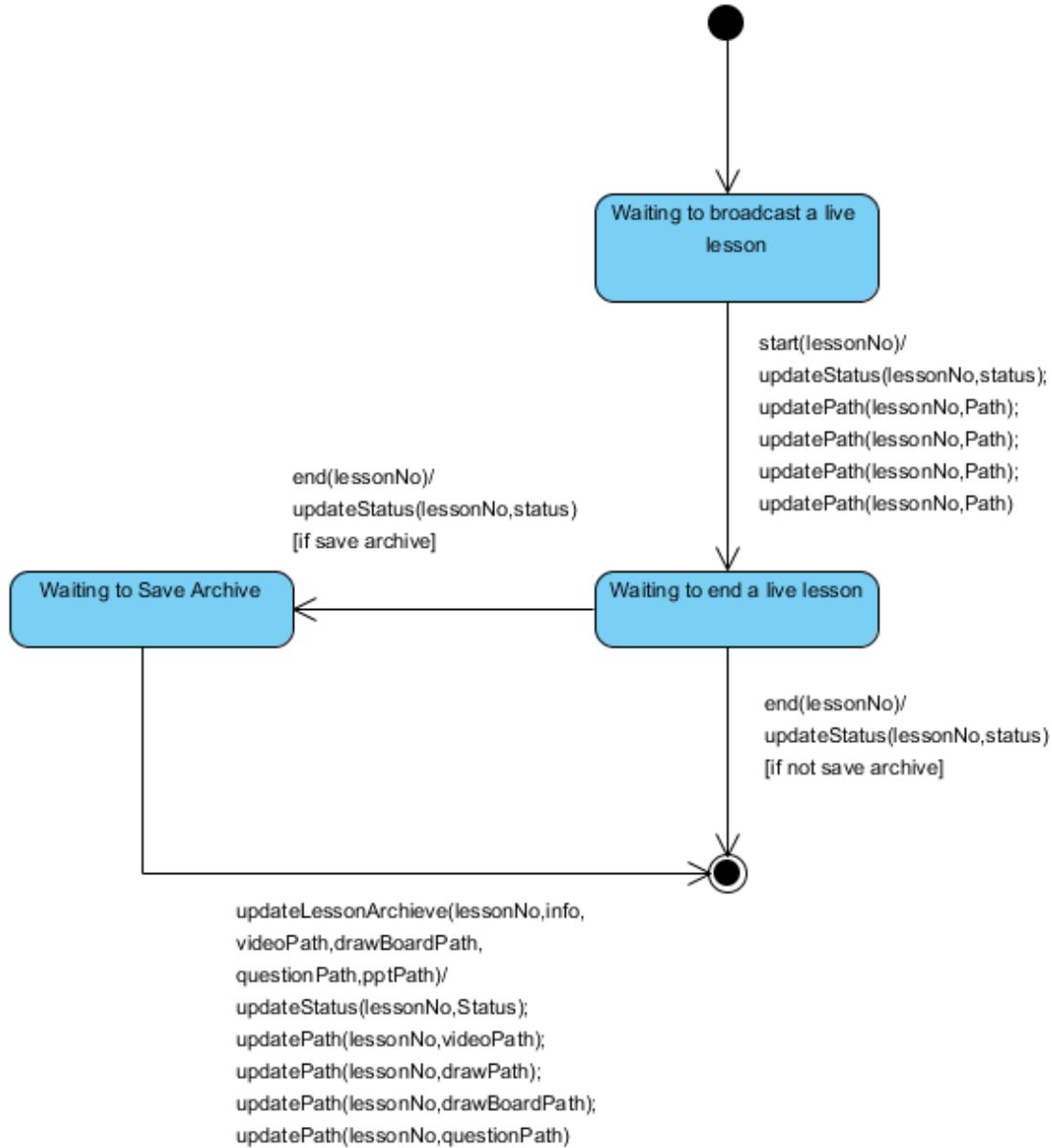
Powerpoint – web



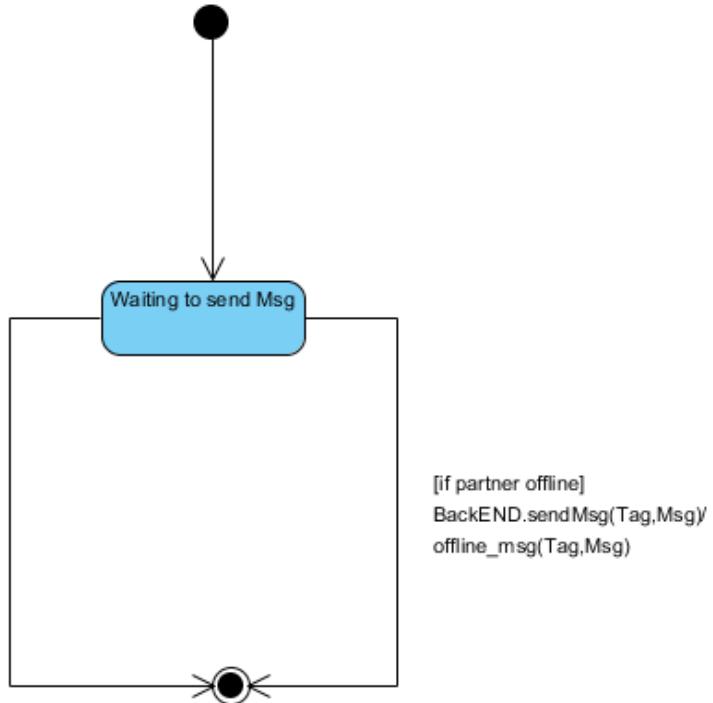
Teacher Control Online WhiteBoard



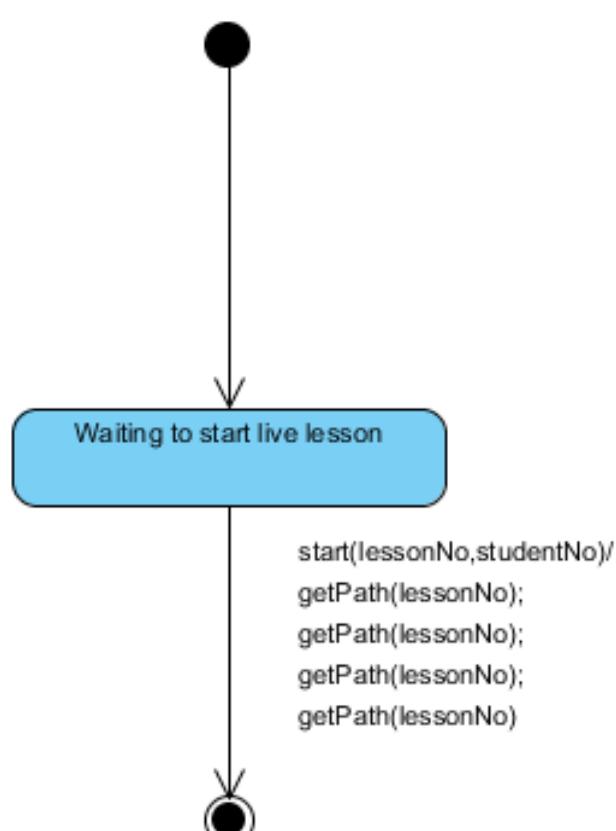
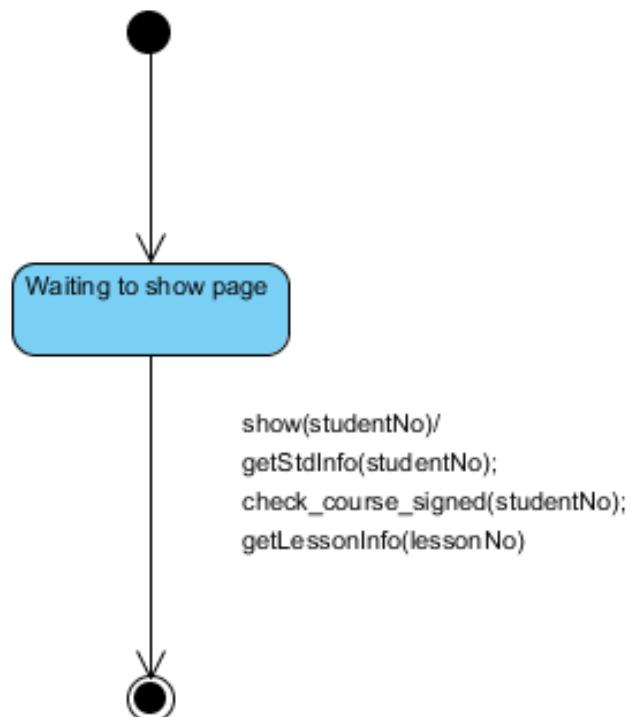
Student View Online WhiteBoard

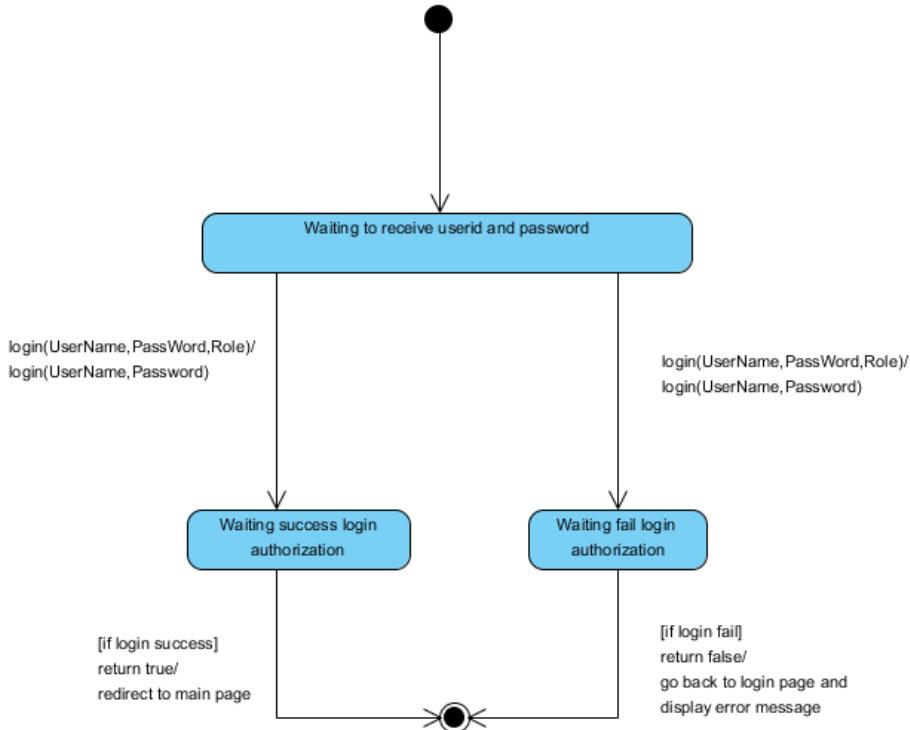


Broadcast

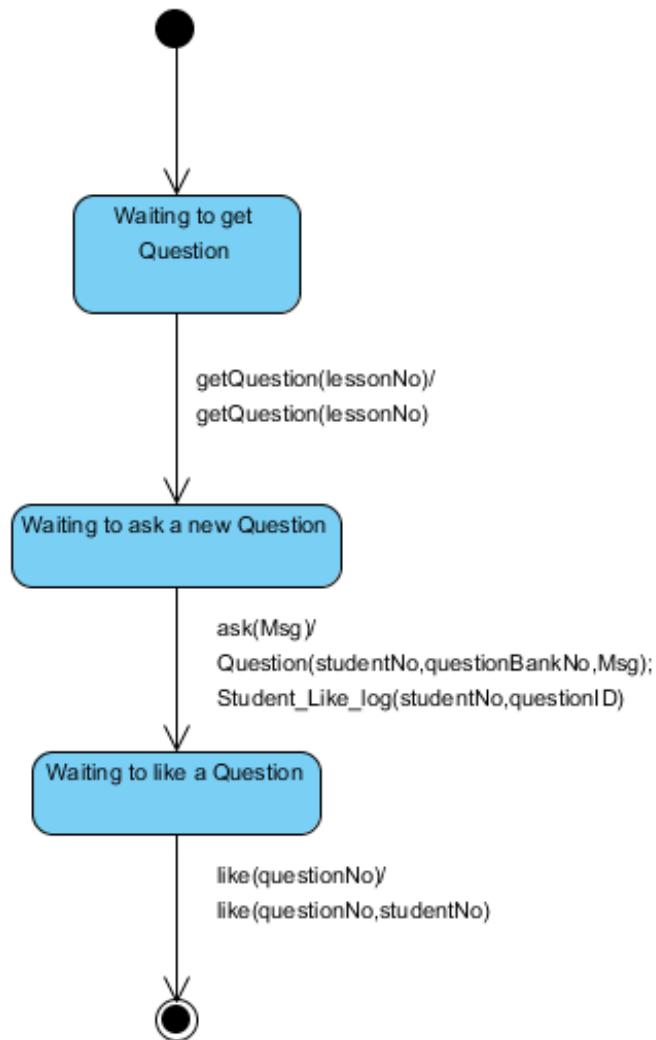


Instant Message Controller

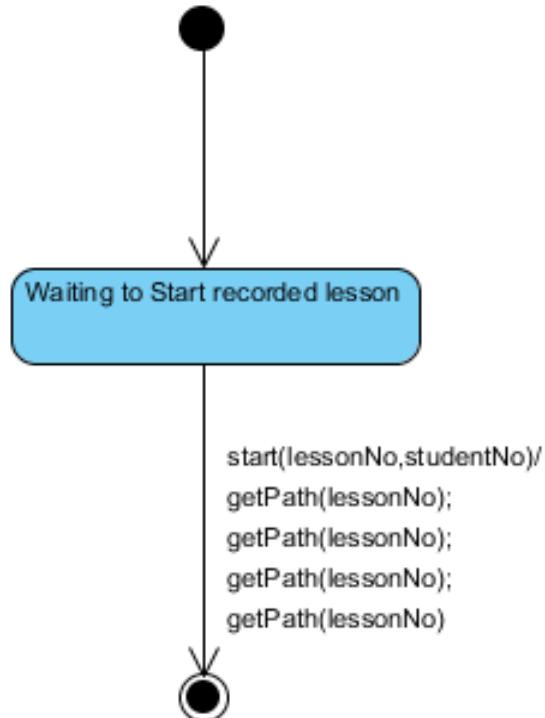




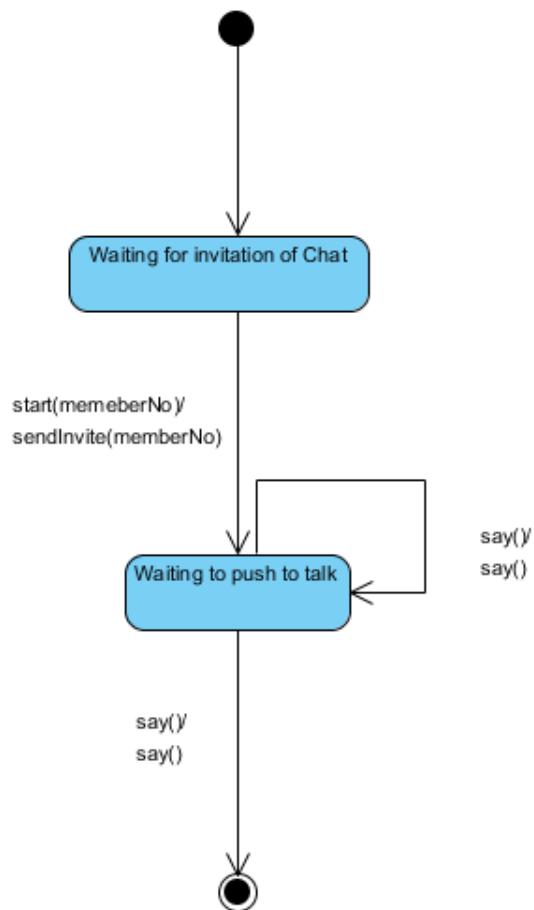
Login Controller



Question Bank Controller

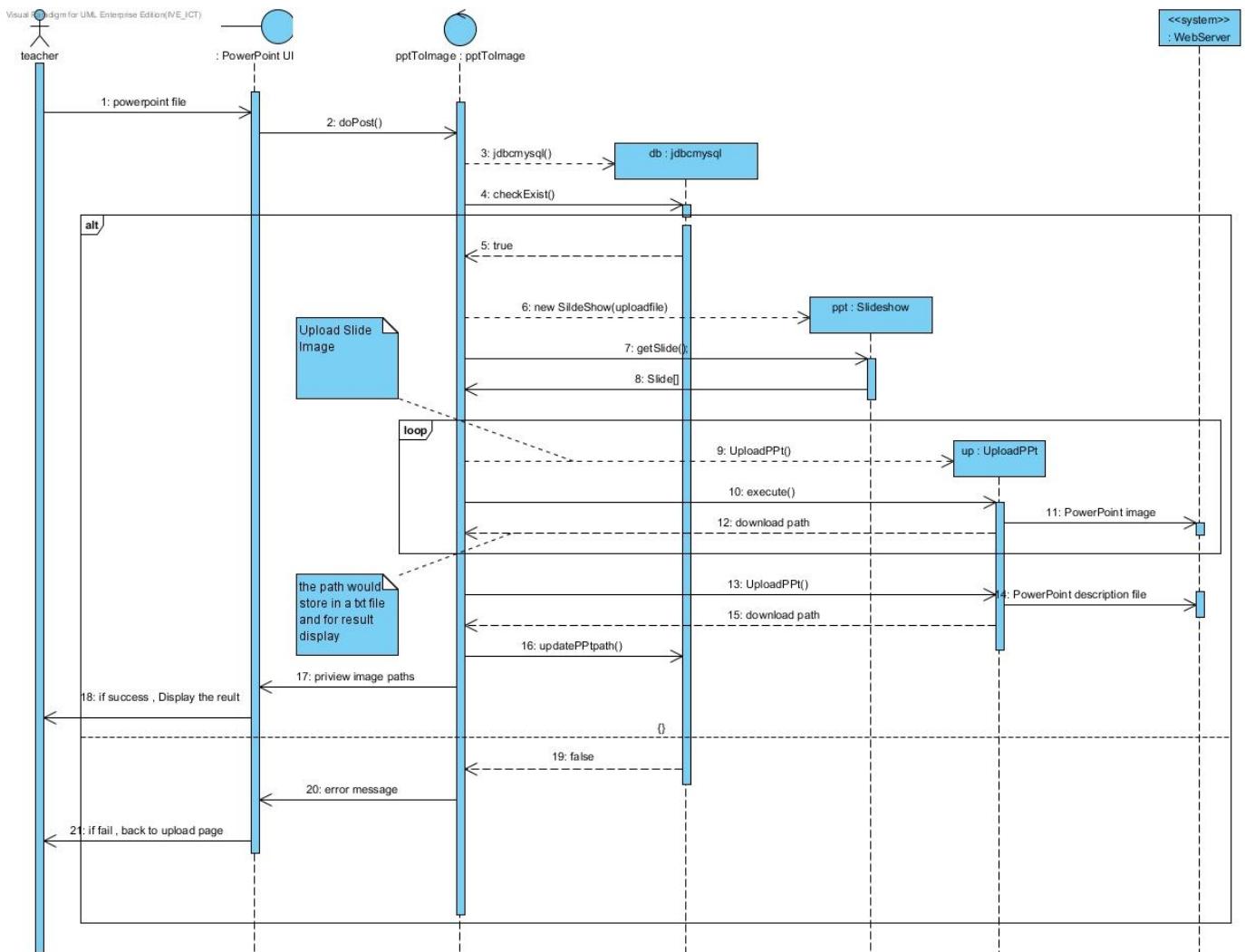


Record Lesson Controller

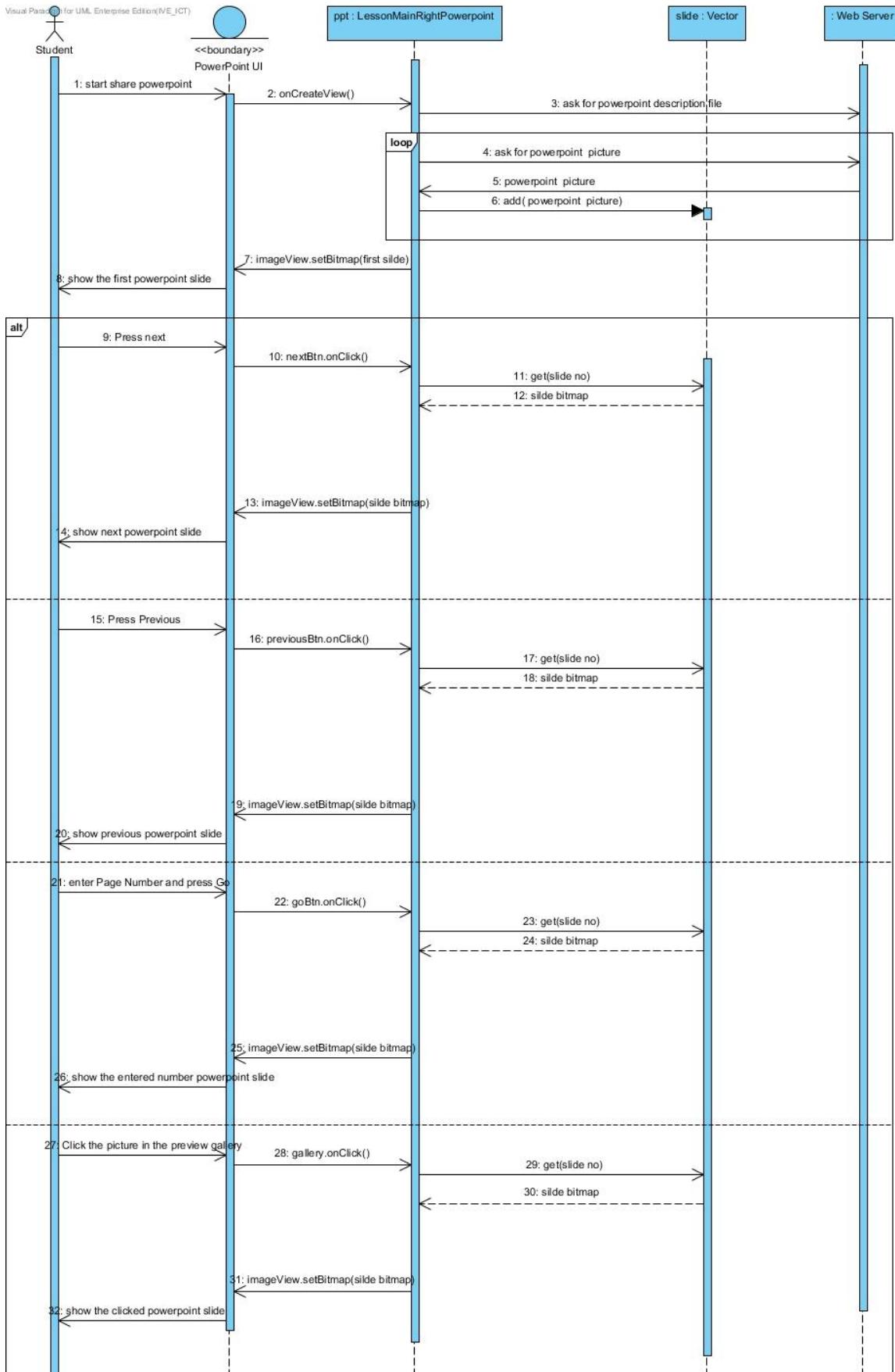


Voice Chat Controller

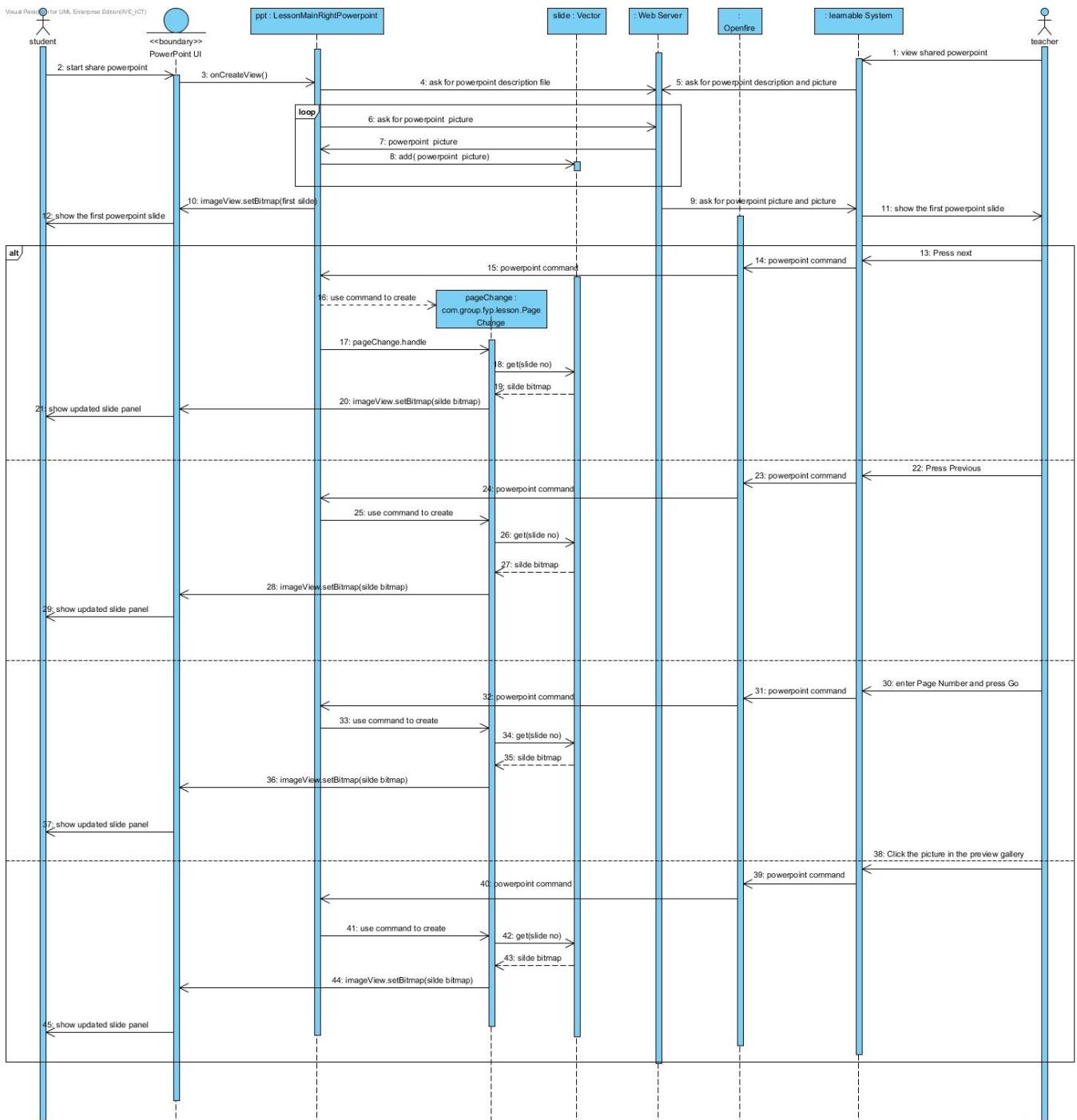
Sequence Diagram



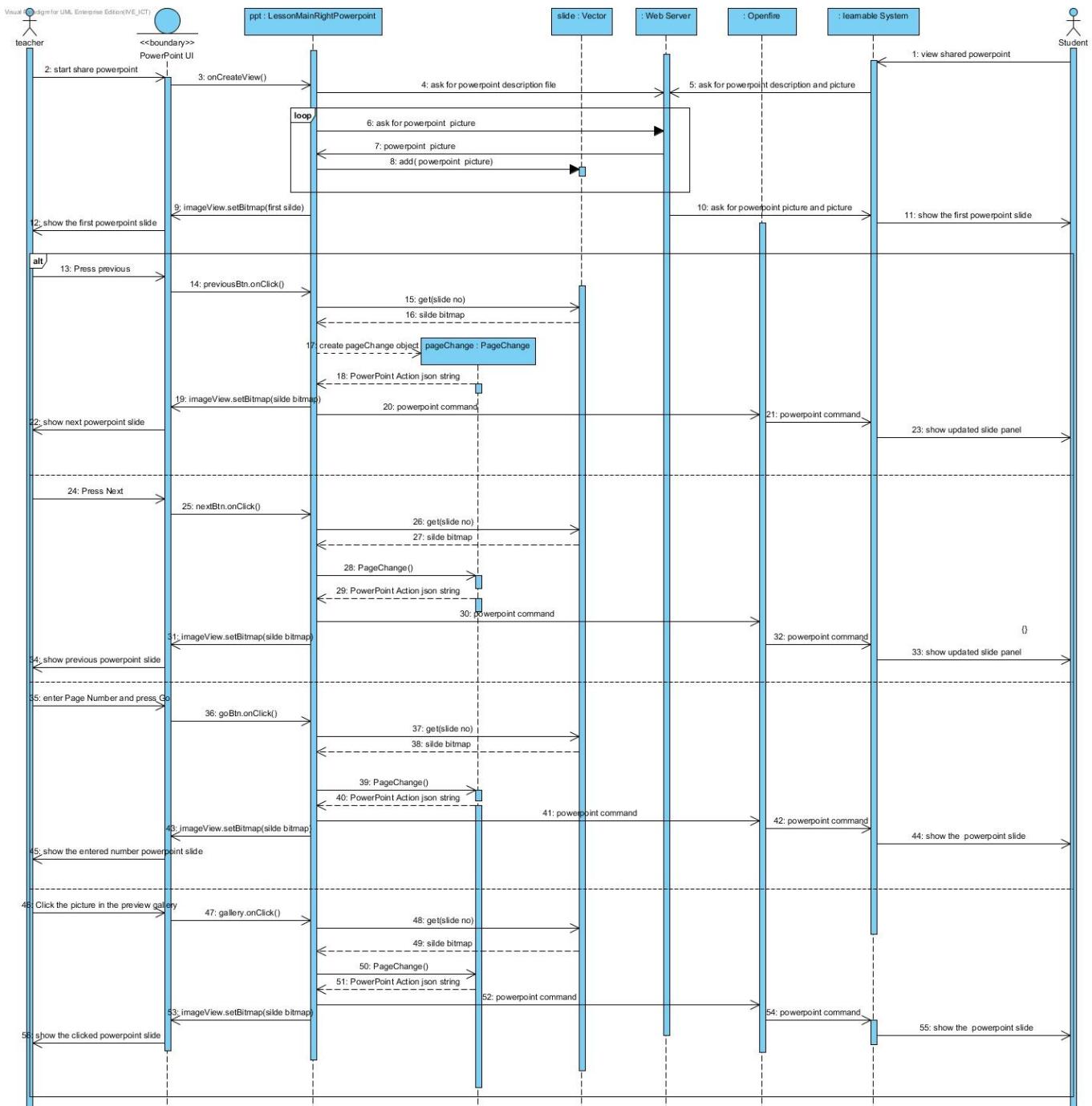
Upload Powerpoint MVC



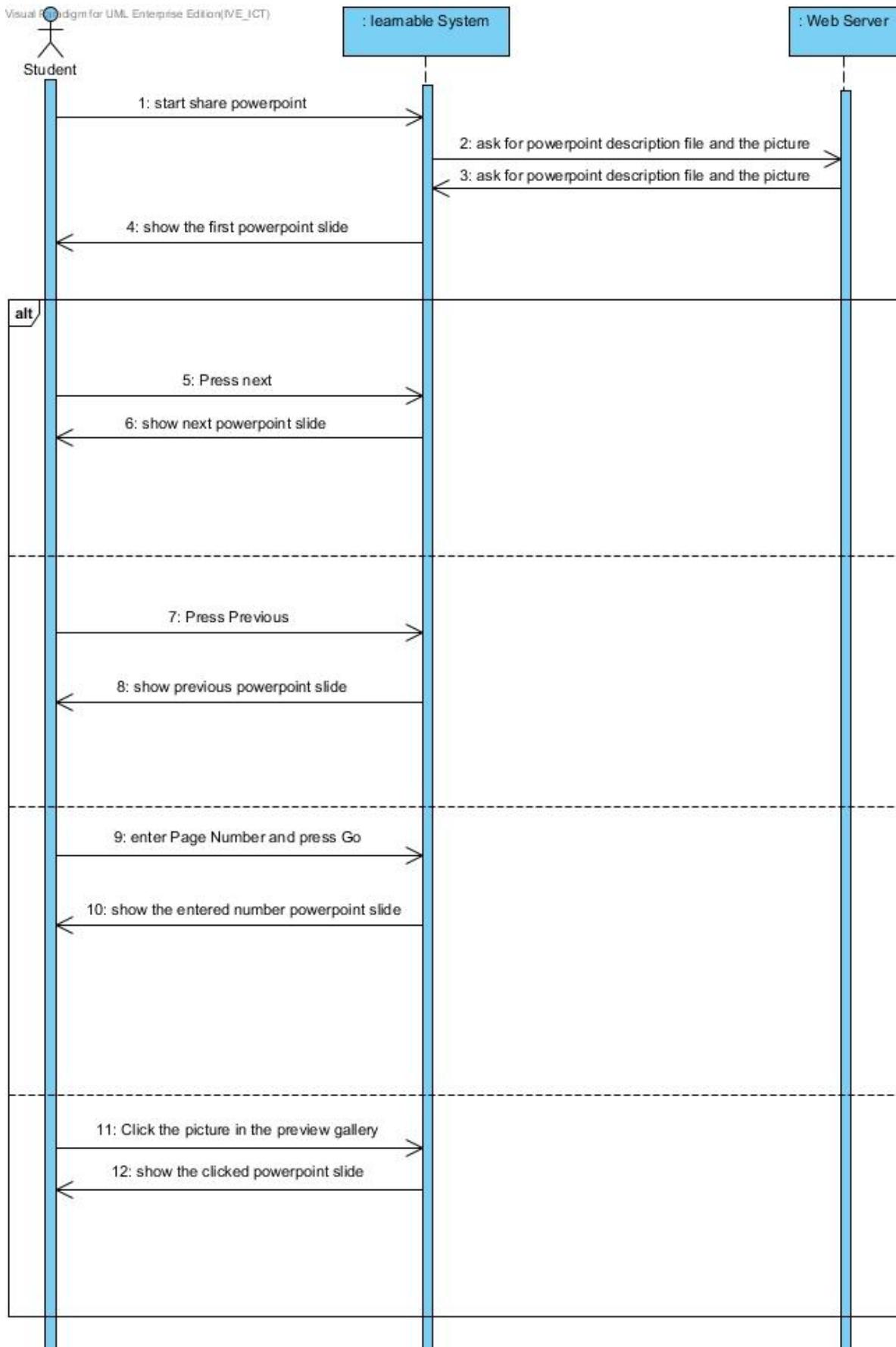
Offline Powerpoint MVC



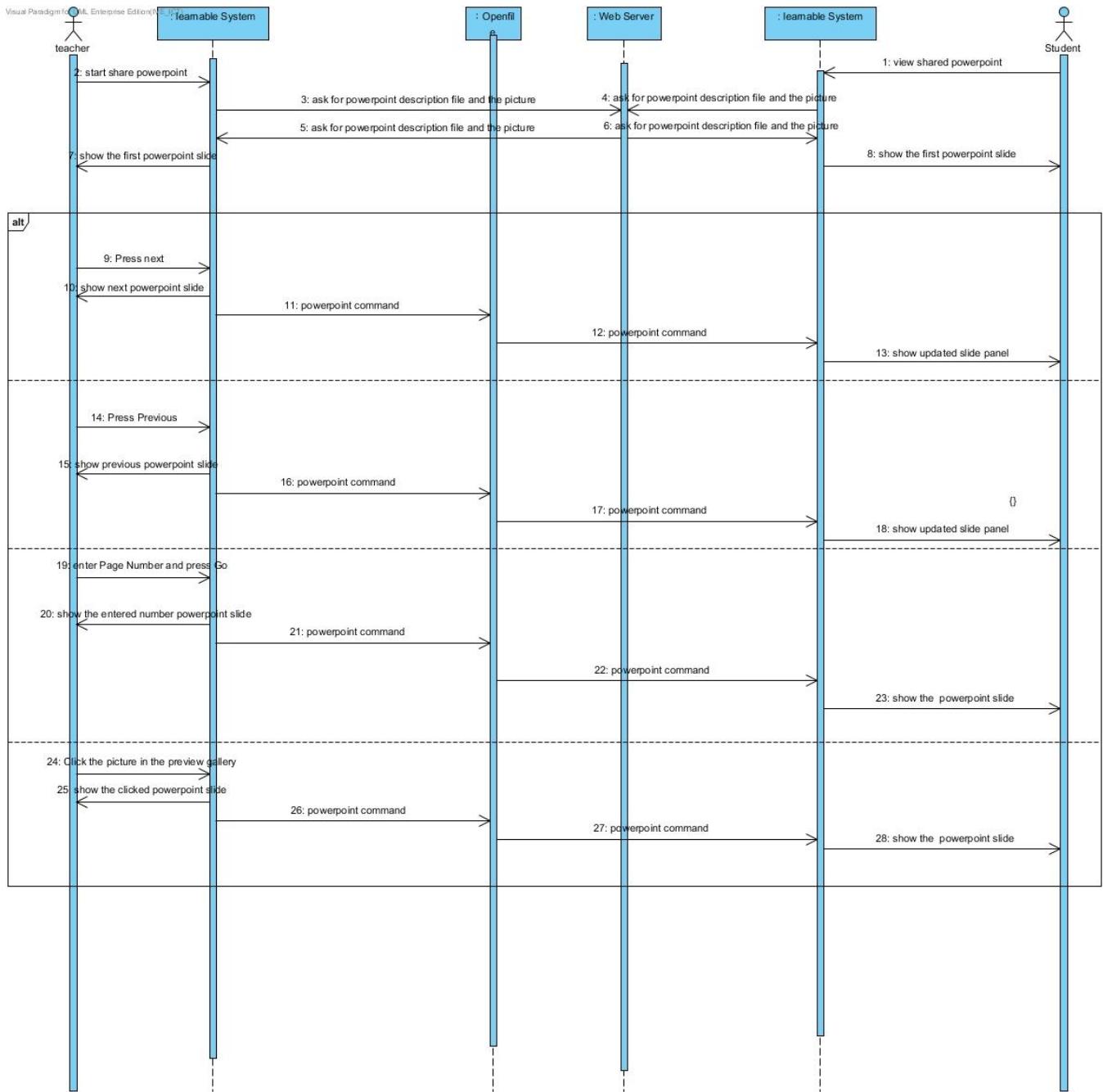
Student Online Powerpoint MVC



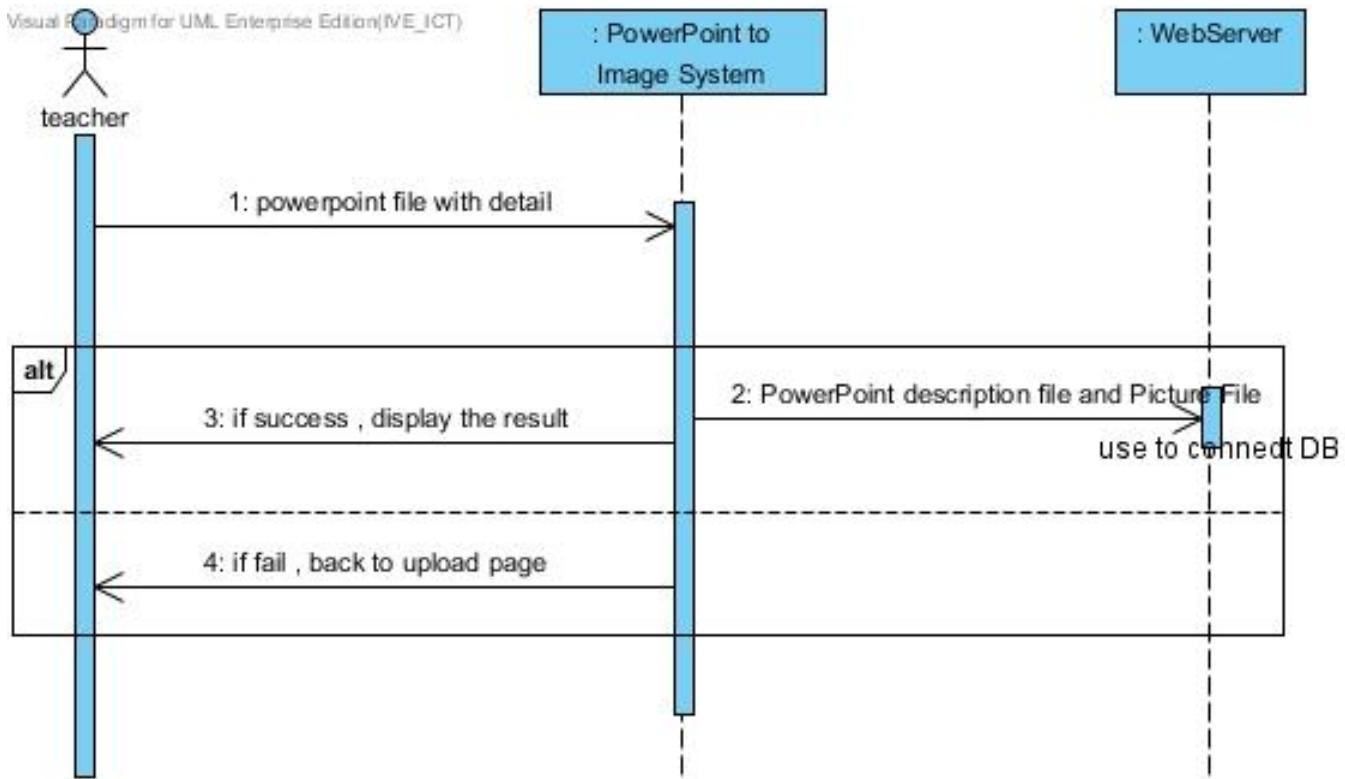
Teacher Online Powerpoint MVC



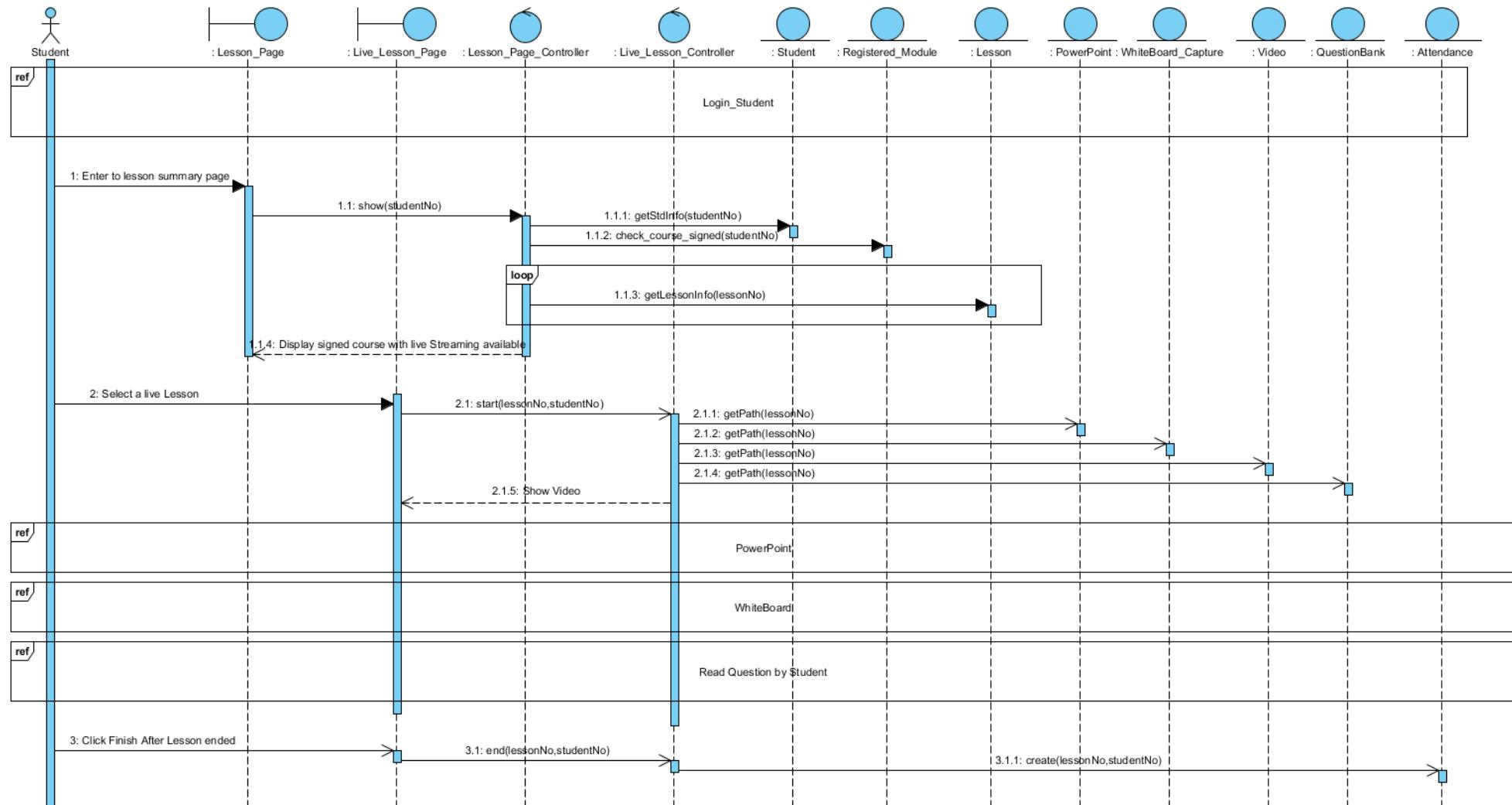
Offline Powerpoint

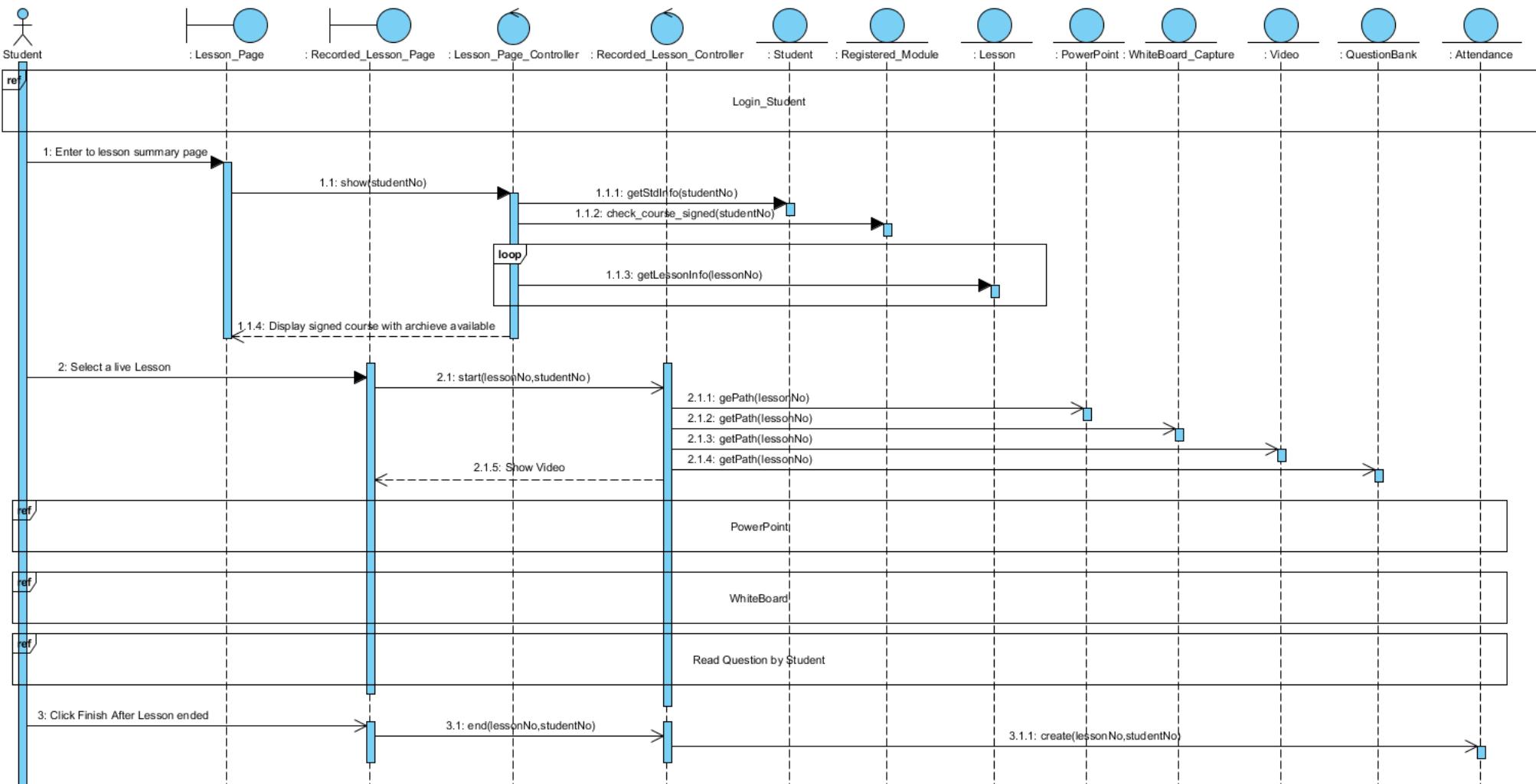


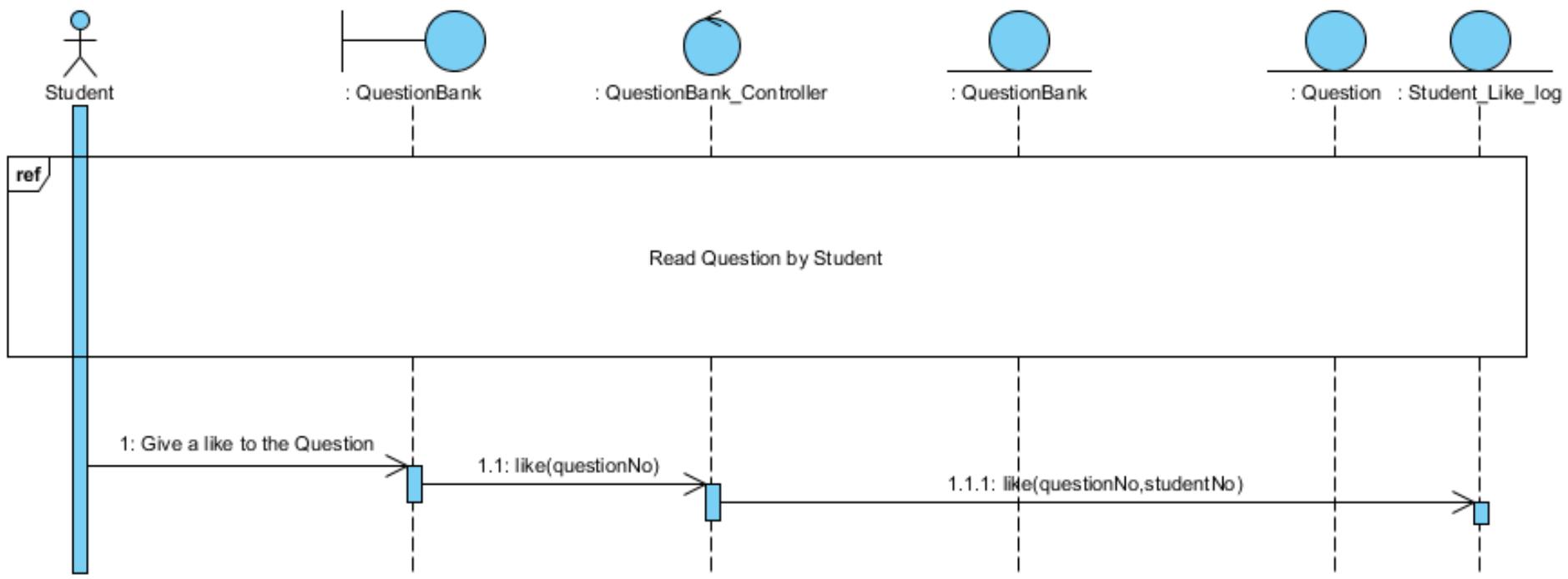
Online PowerPoint



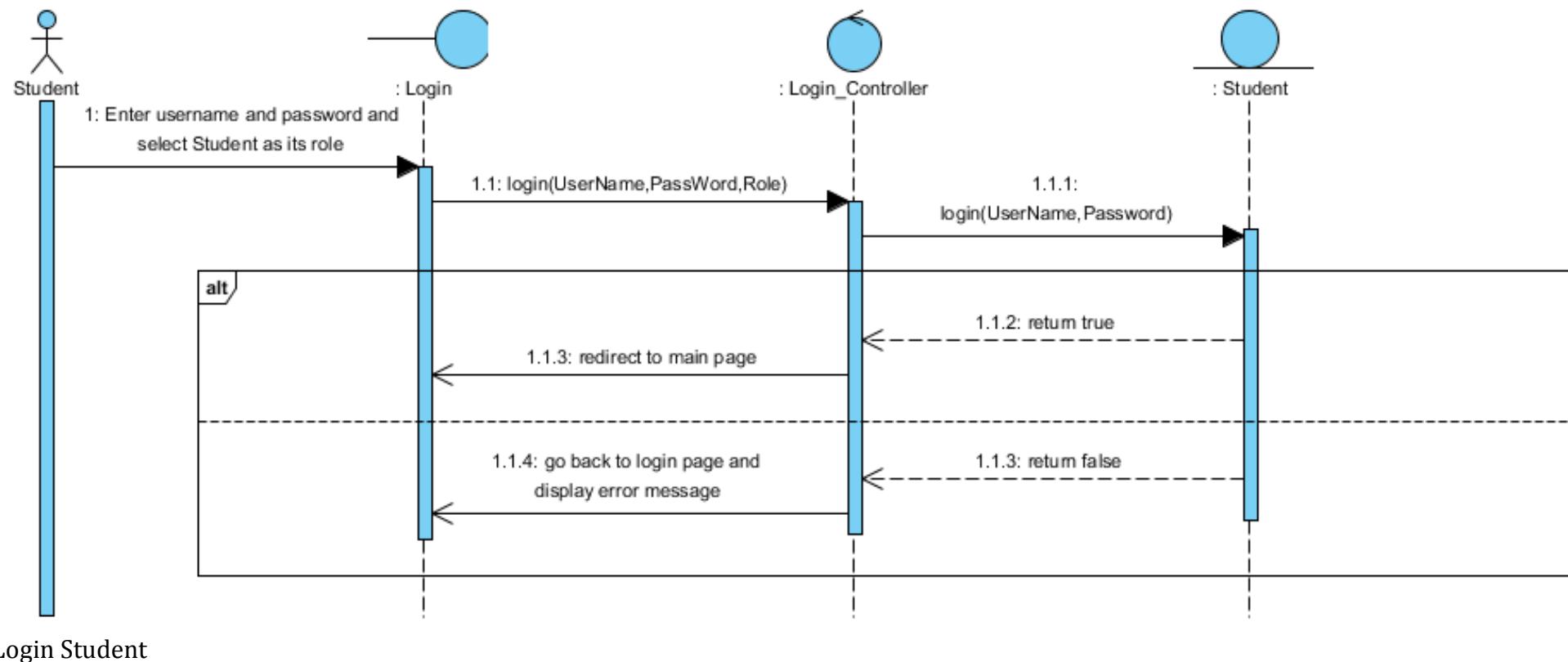
Upload PowerPoint

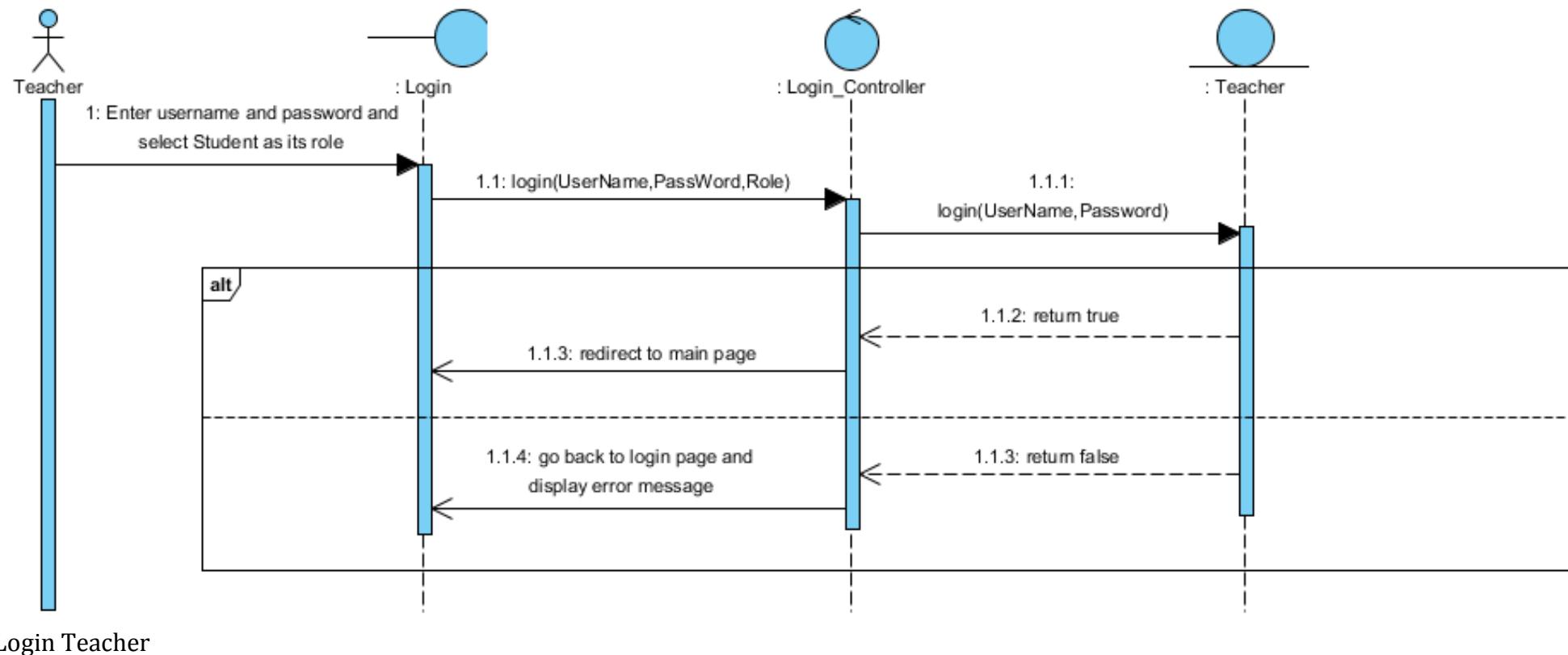


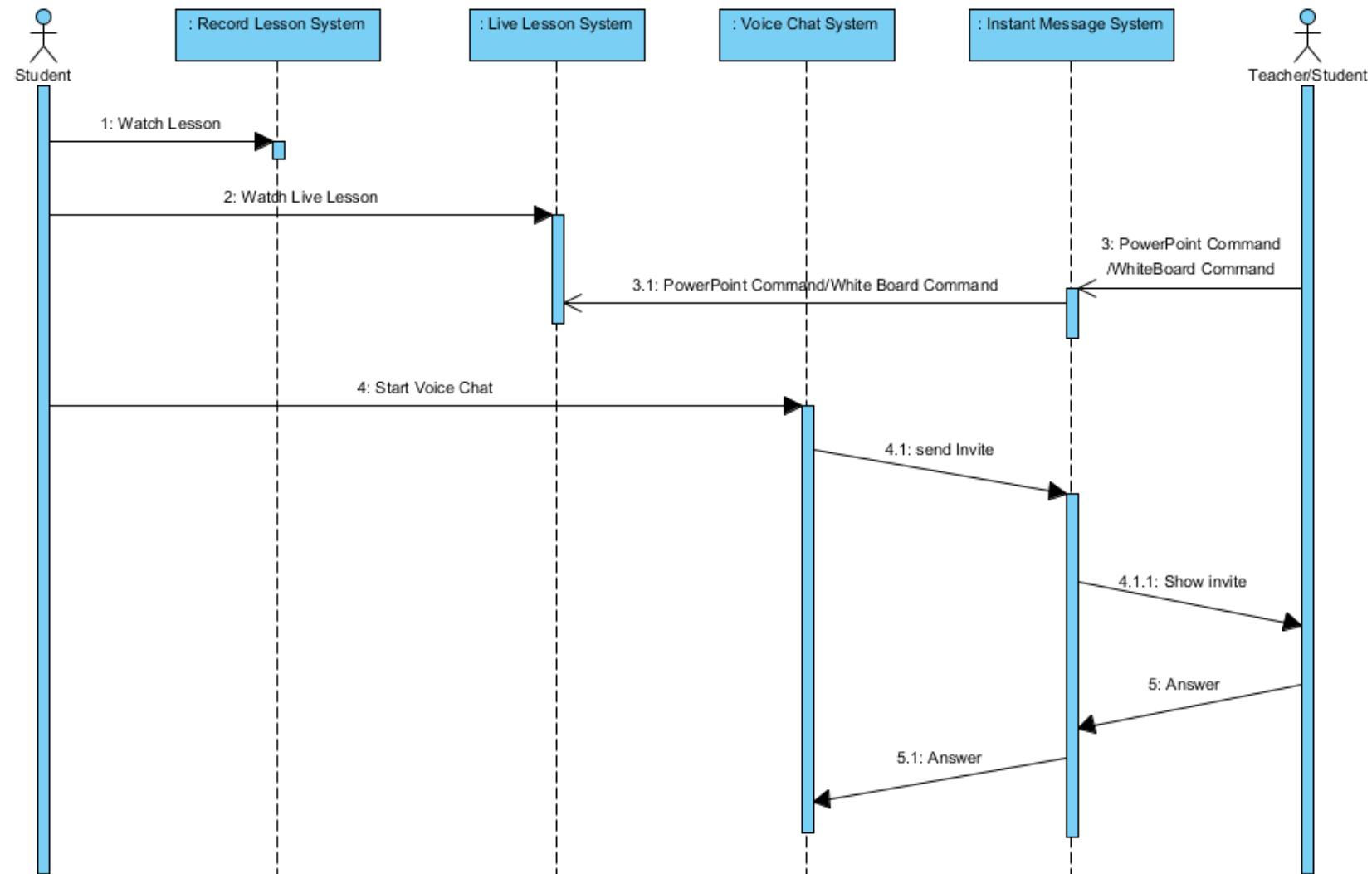




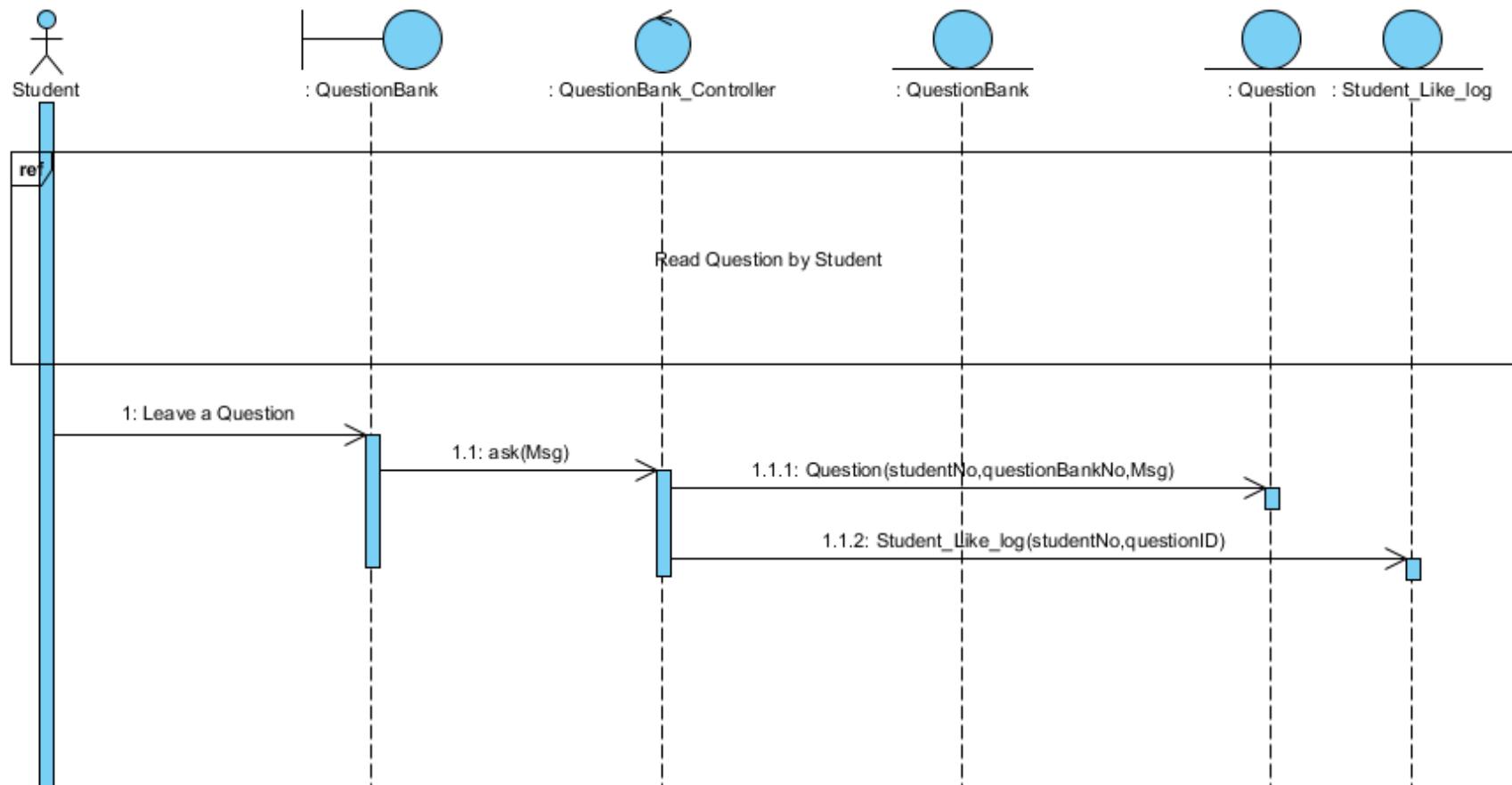
Like Question

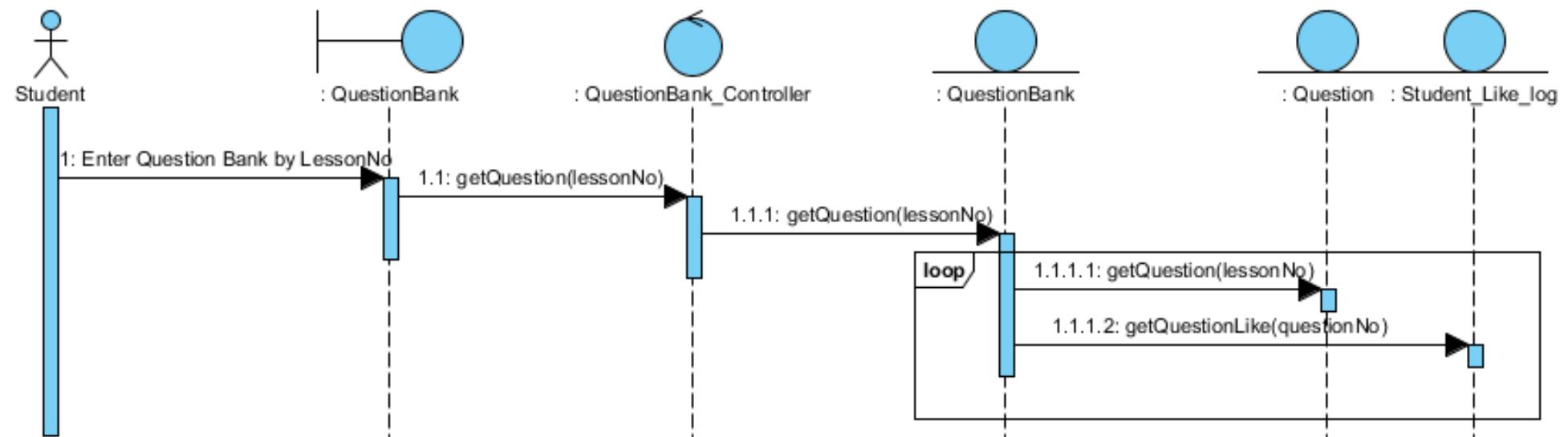




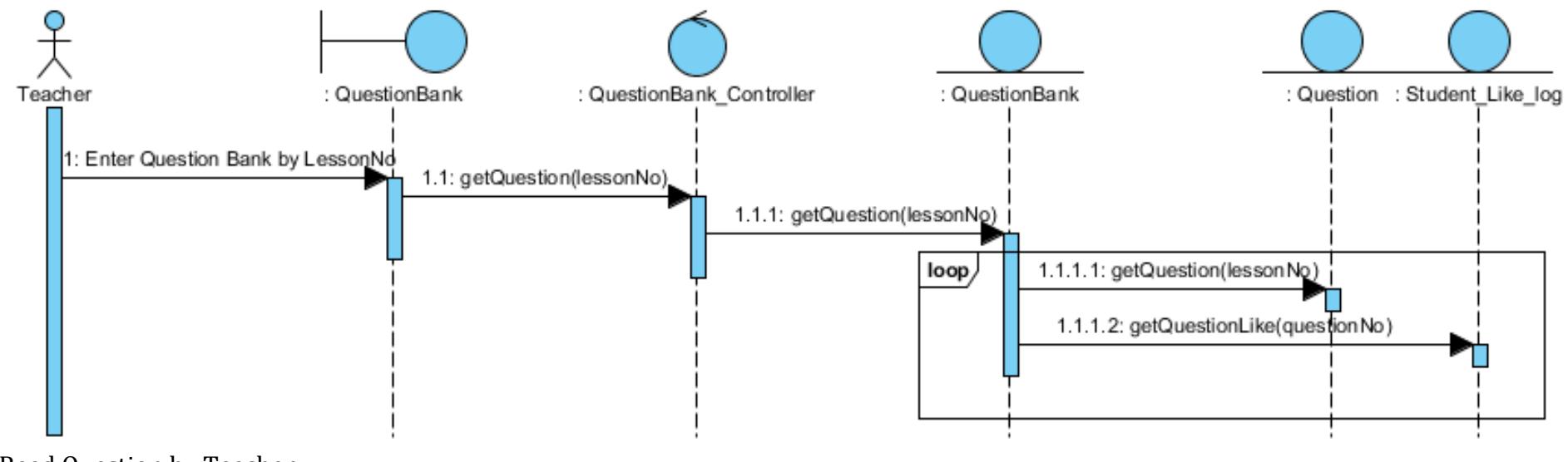


Overview

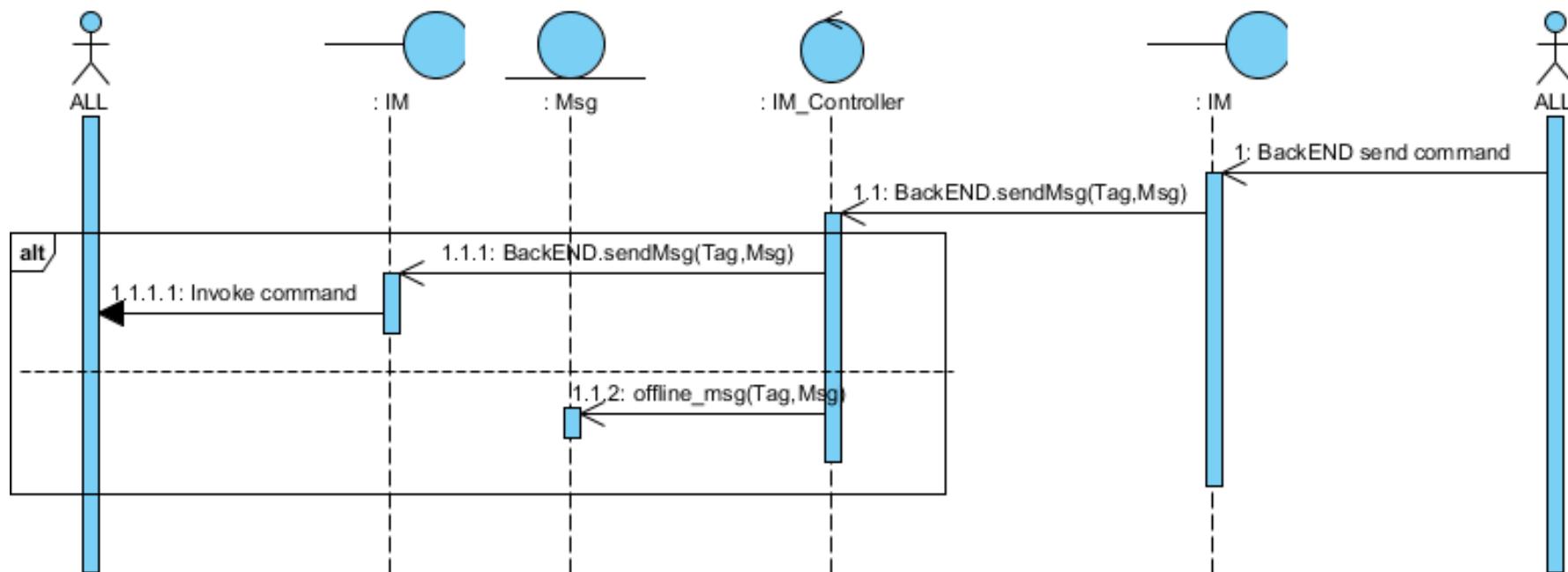




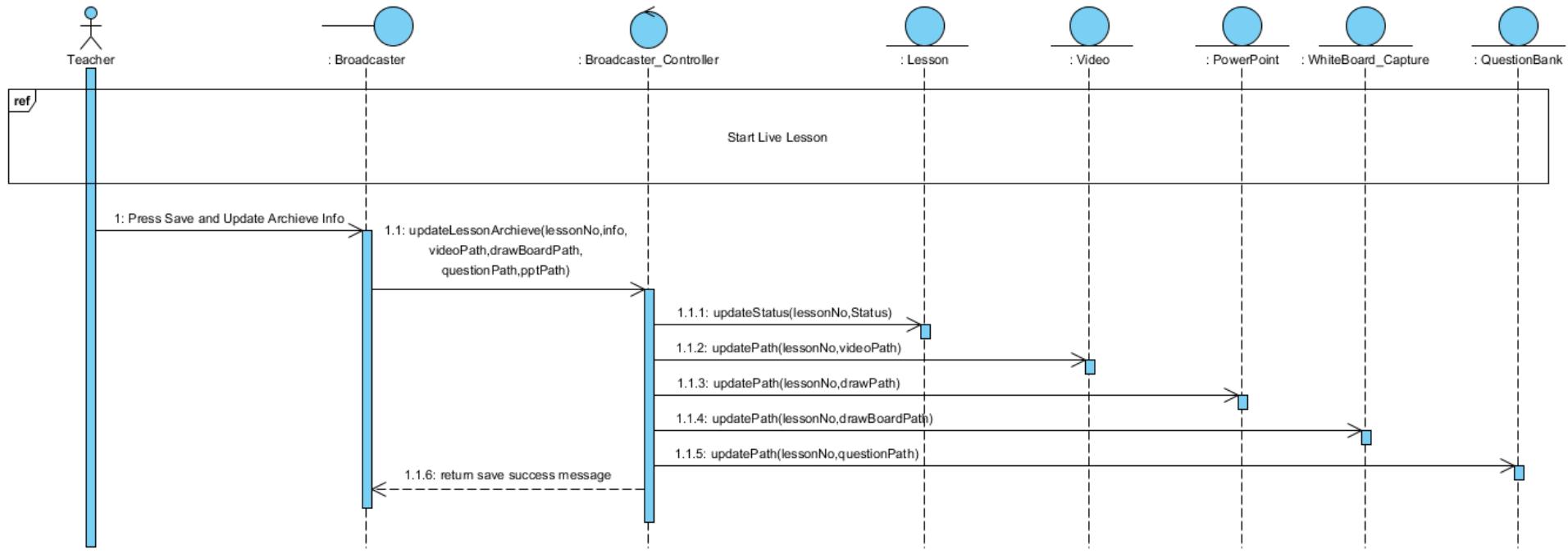
Read Question by Student



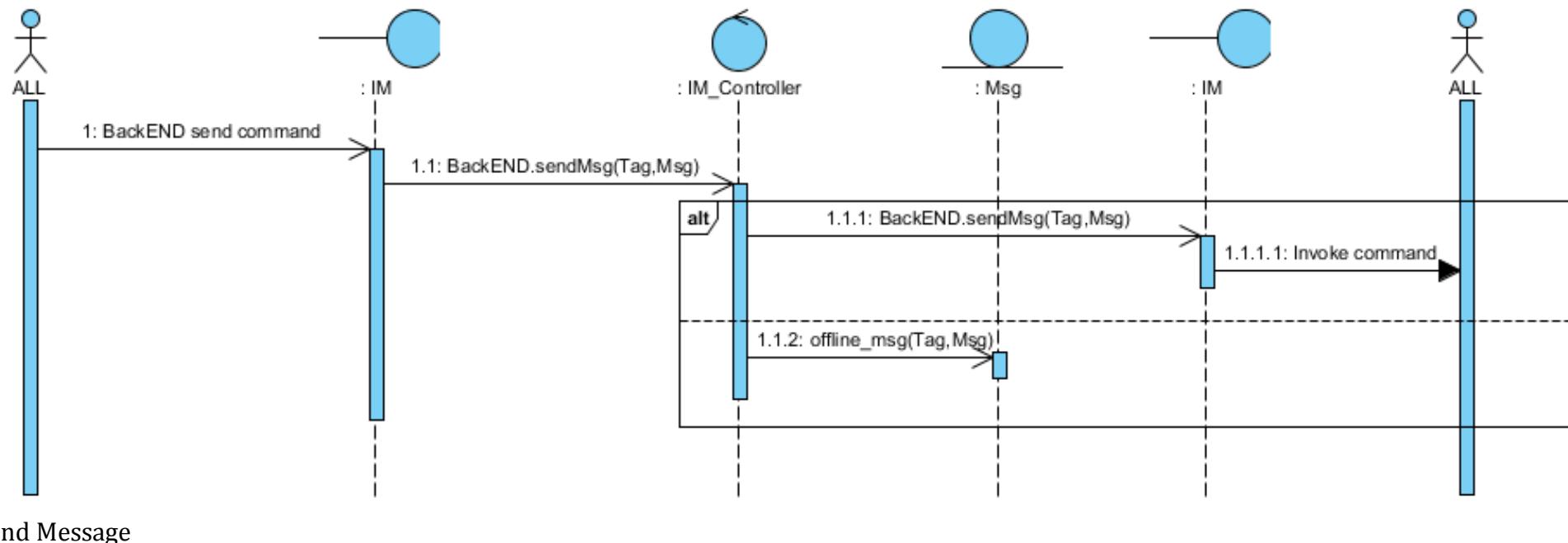
Read Question by Teacher



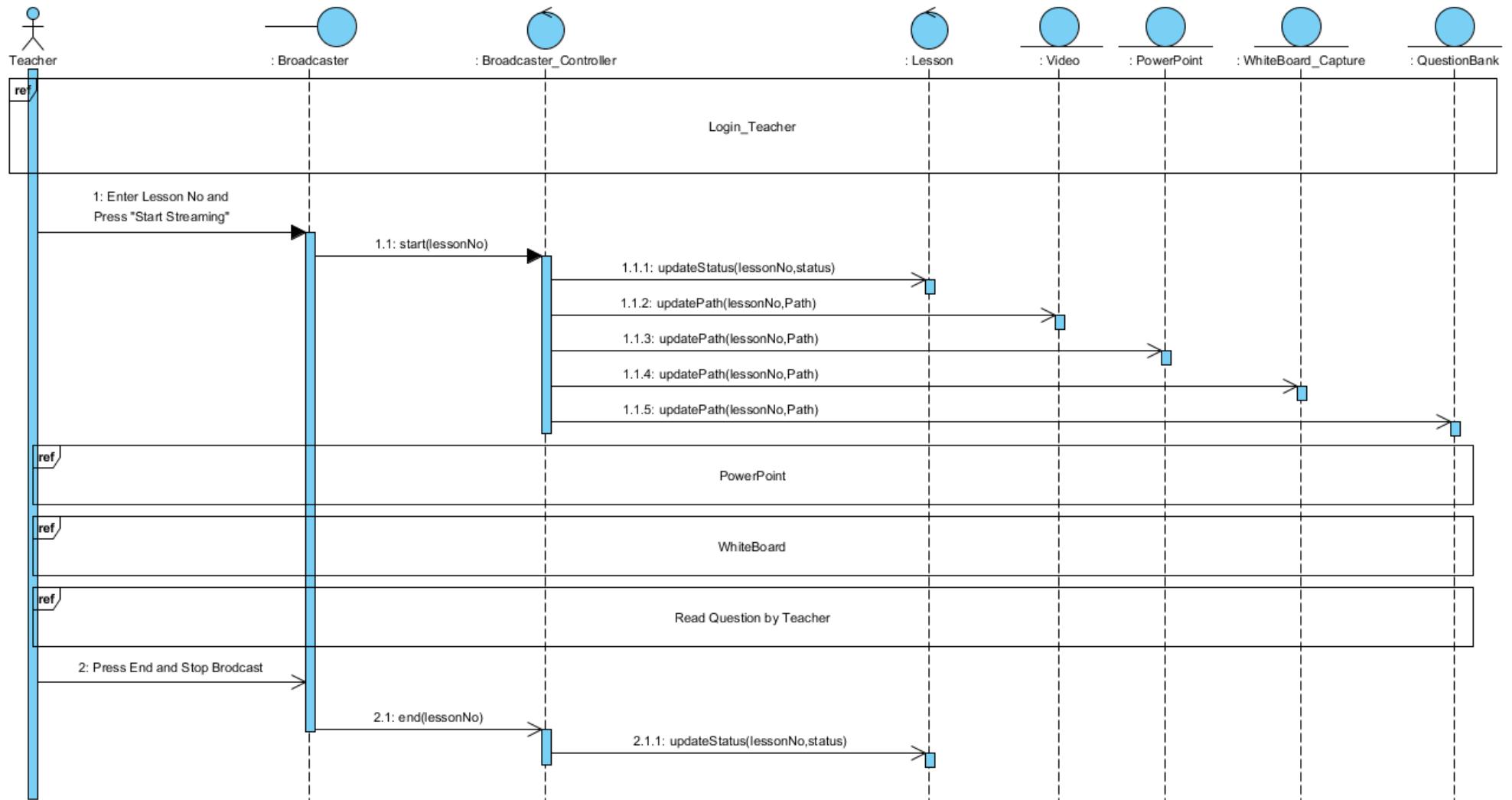
Receive Mesage

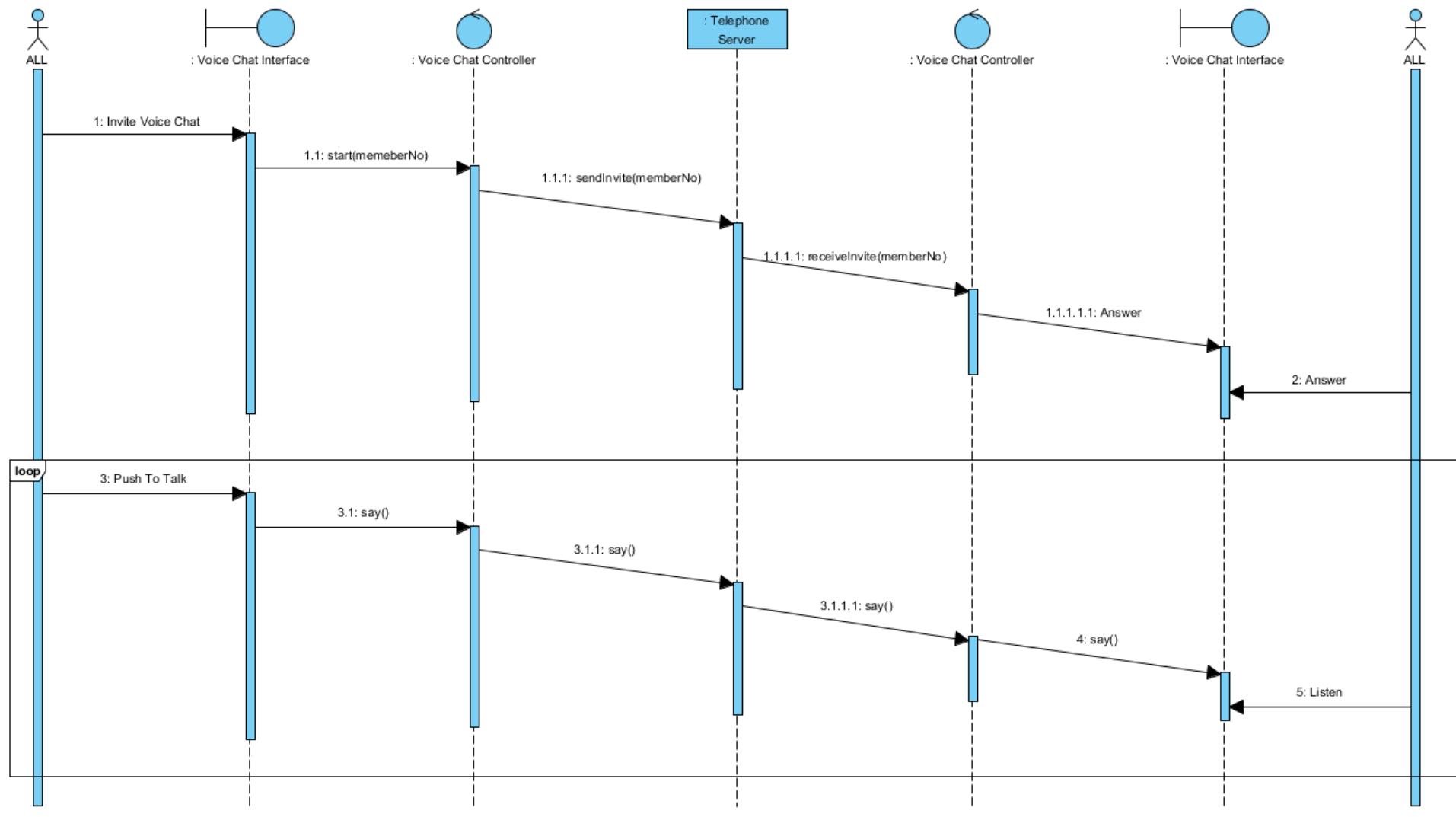


Record Lesson

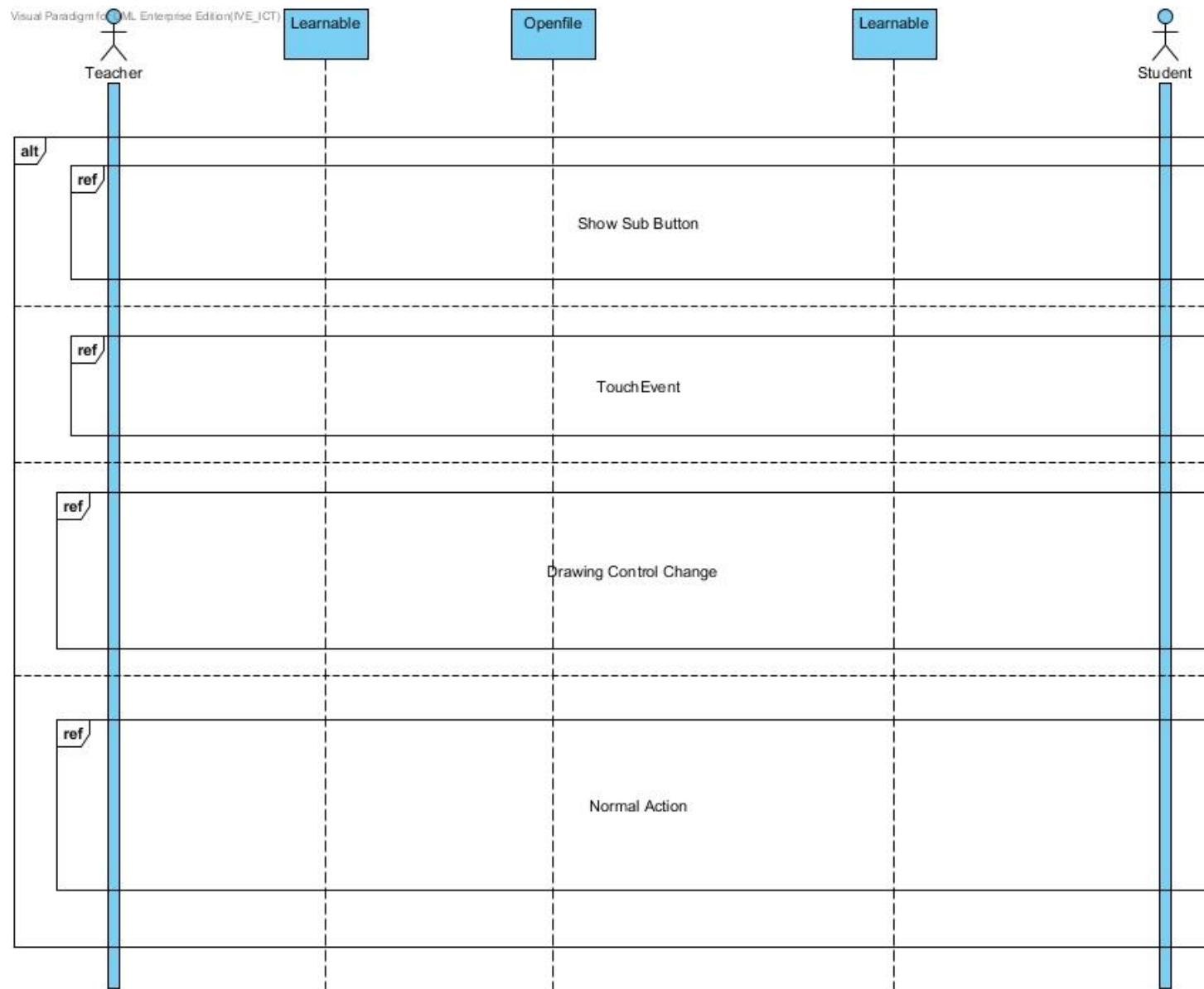


Send Message

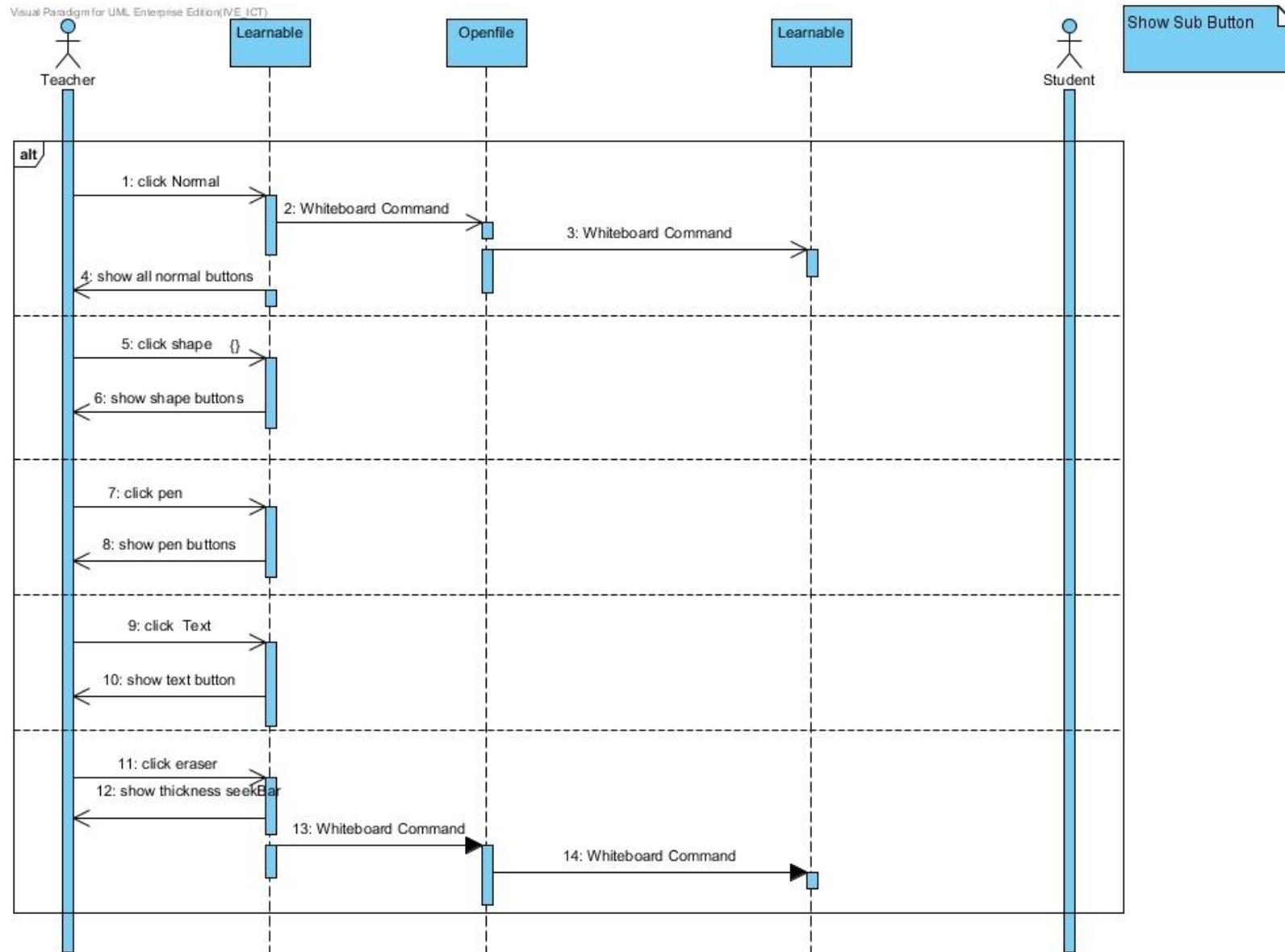




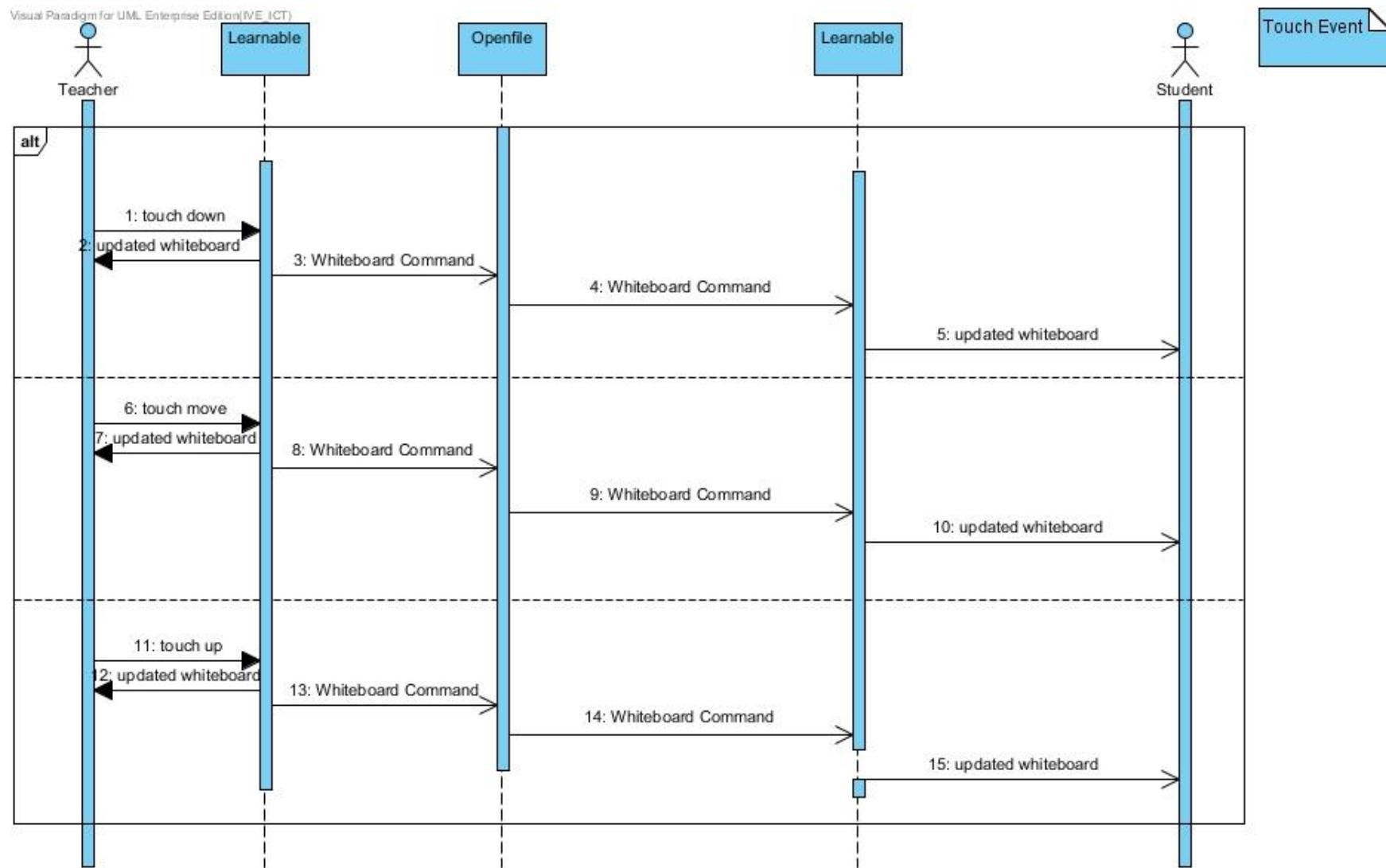
Start Voice Chat



White Board - Main

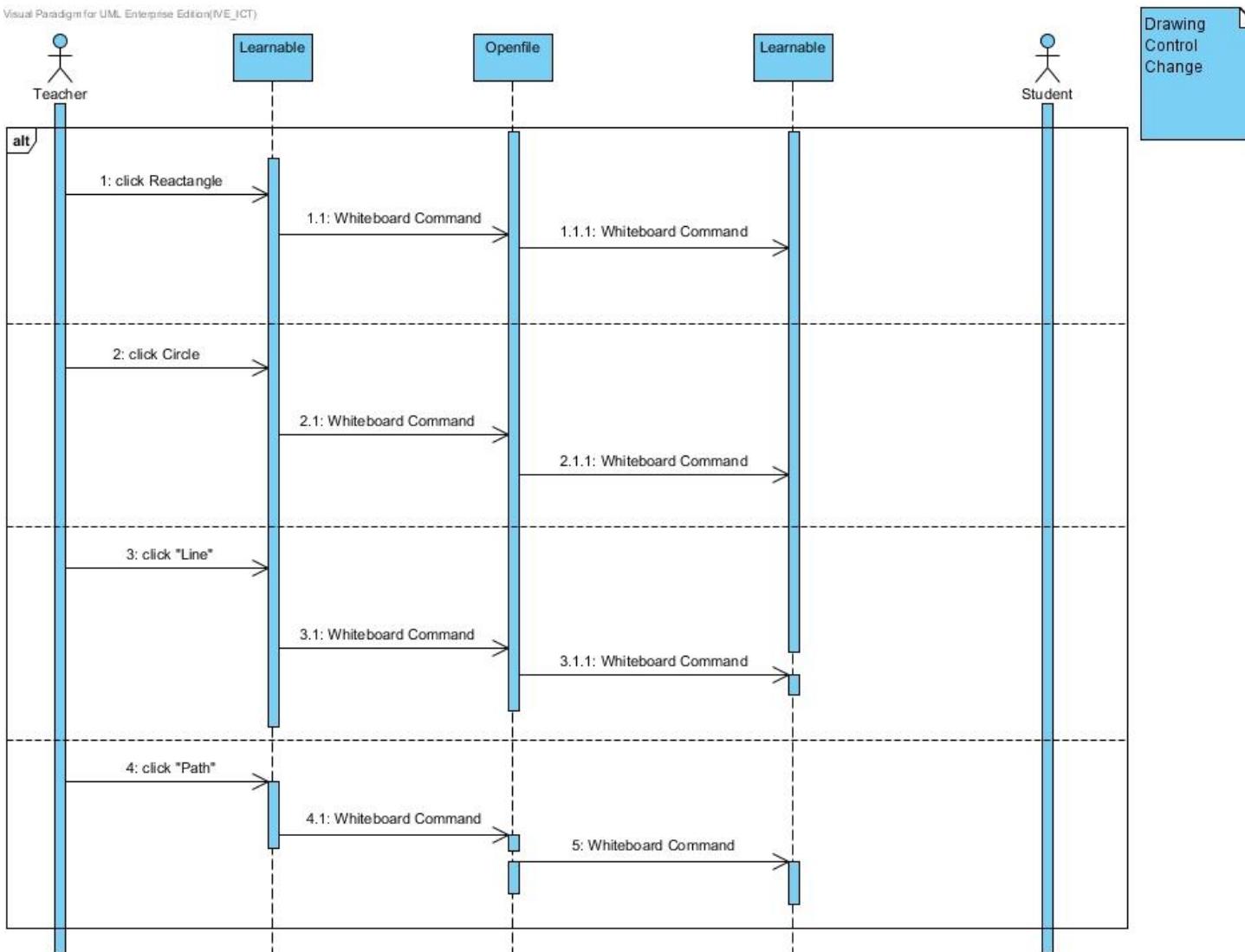


Show Sub Button

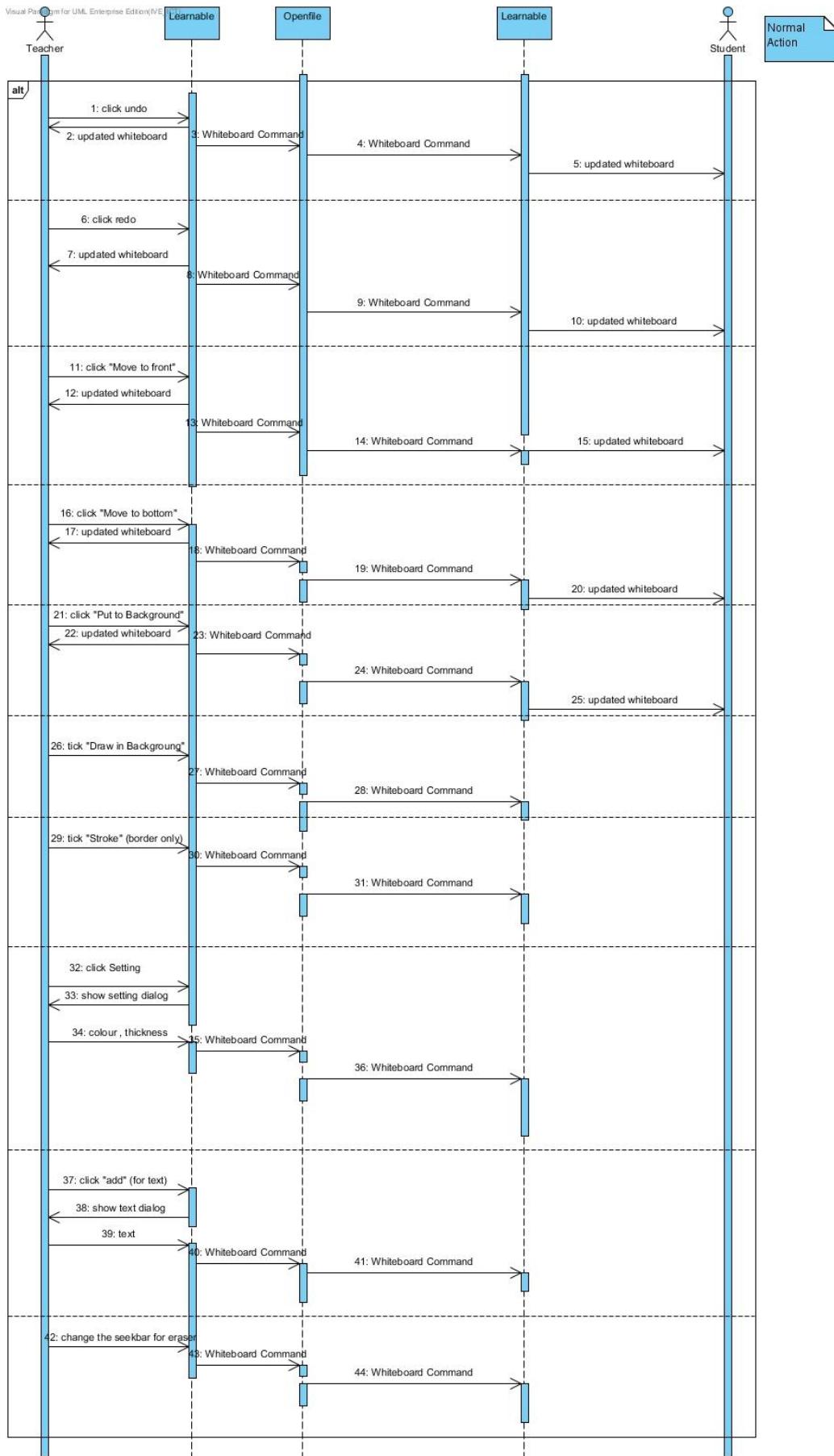


Touch Event

Visual Paradigm for UML Enterprise Edition(VE_ICT)

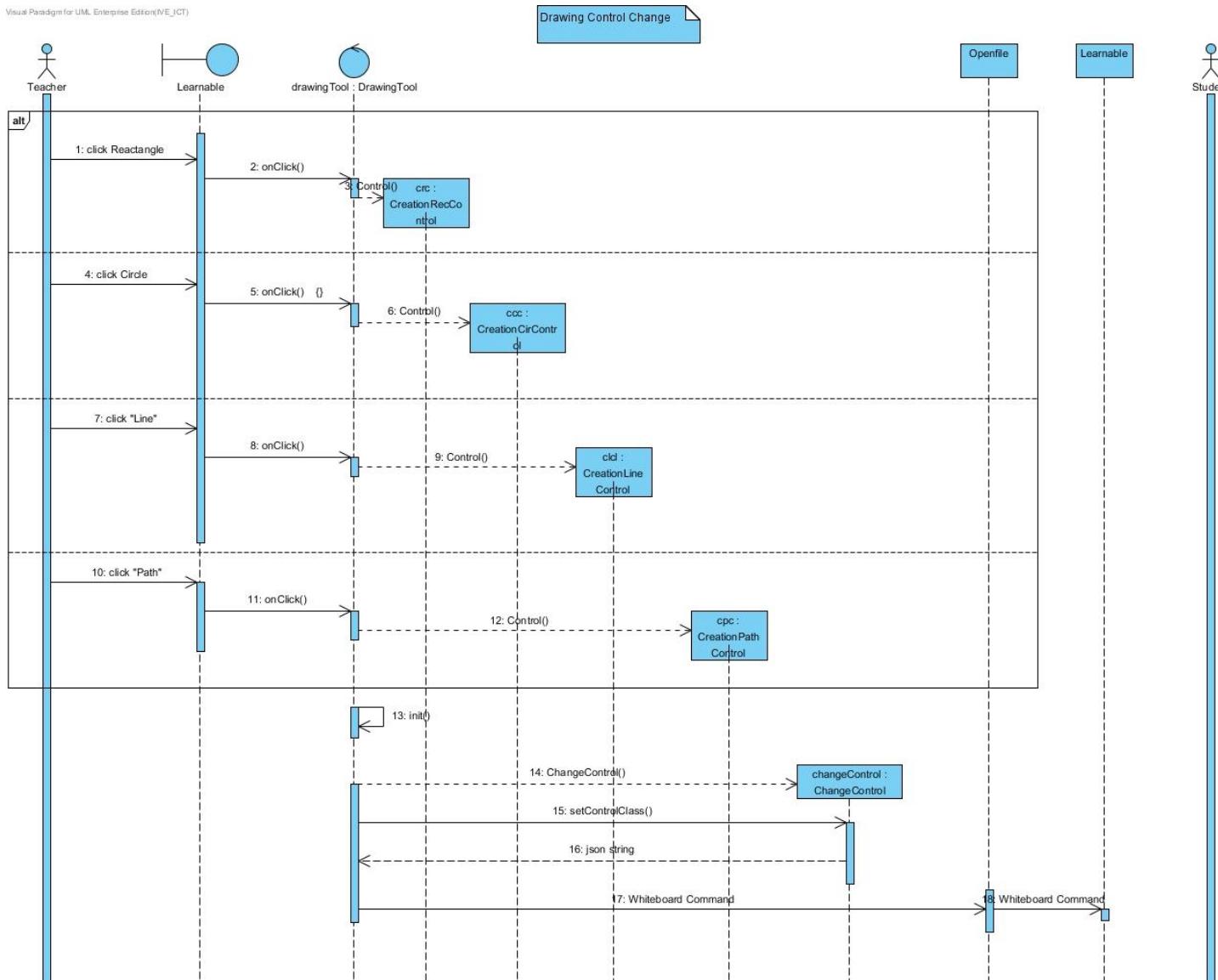


Drawing Control Change

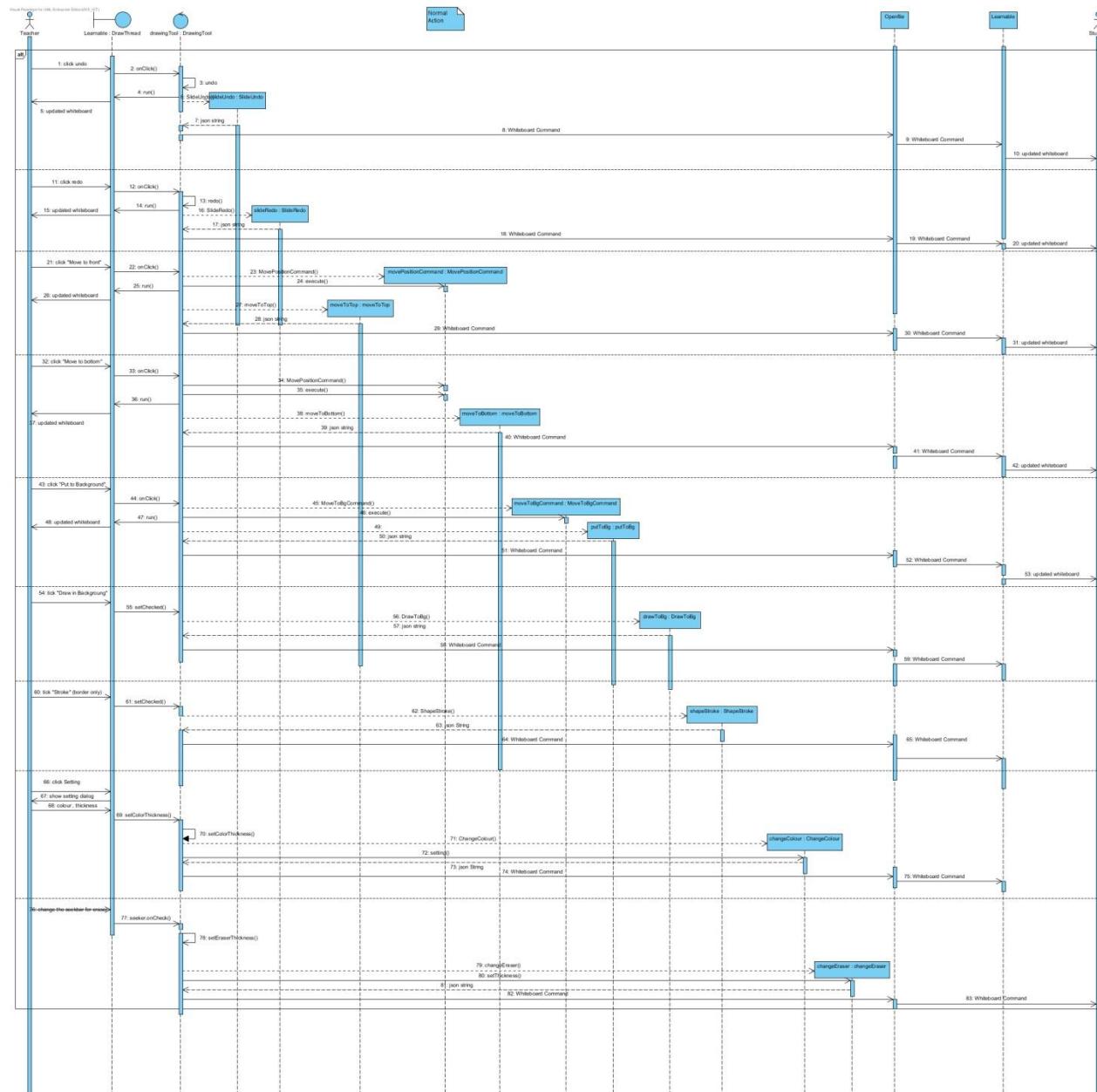


Normal Action

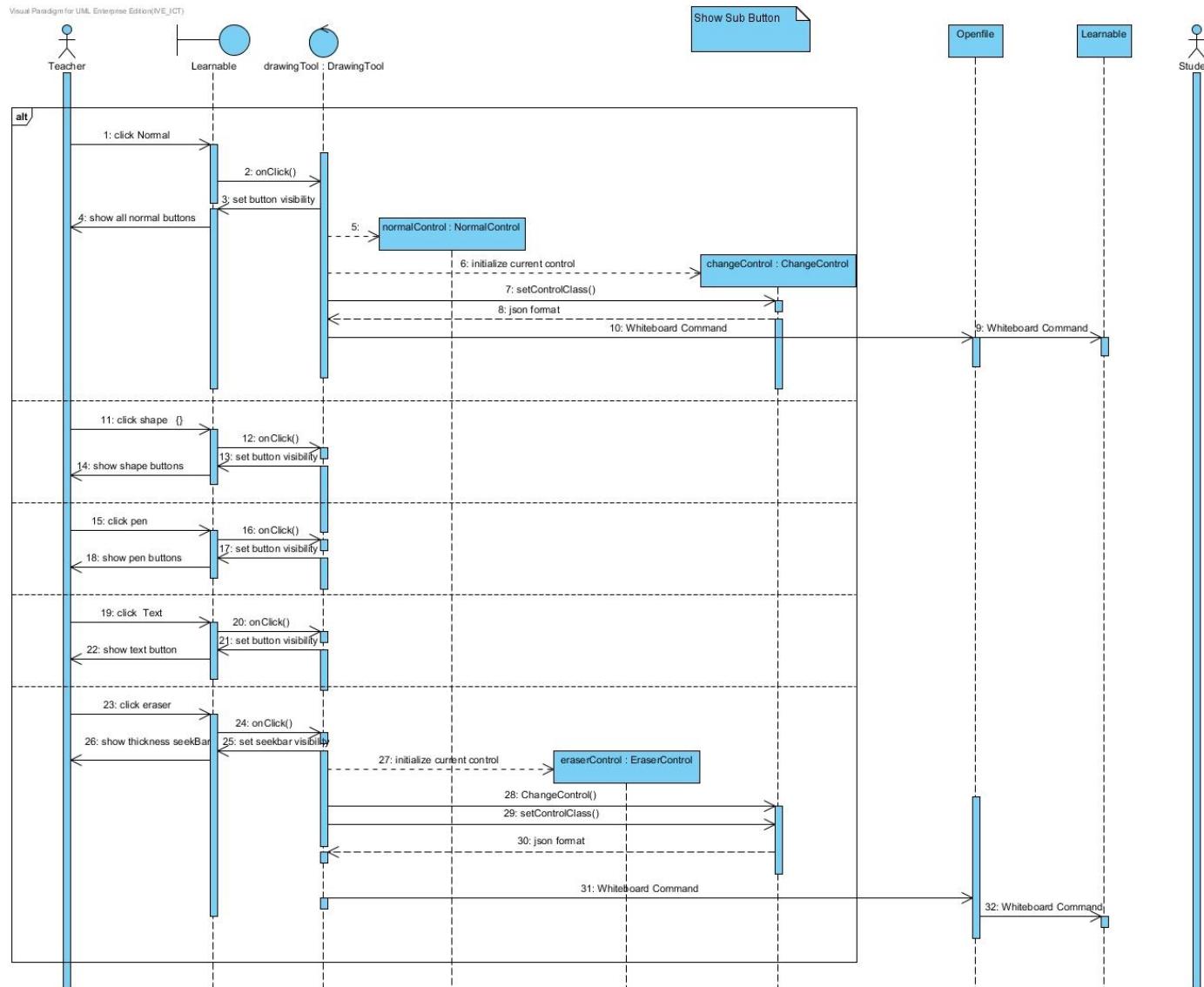
Visual Paradigm for UML Enterprise Edition(ME_ICT)



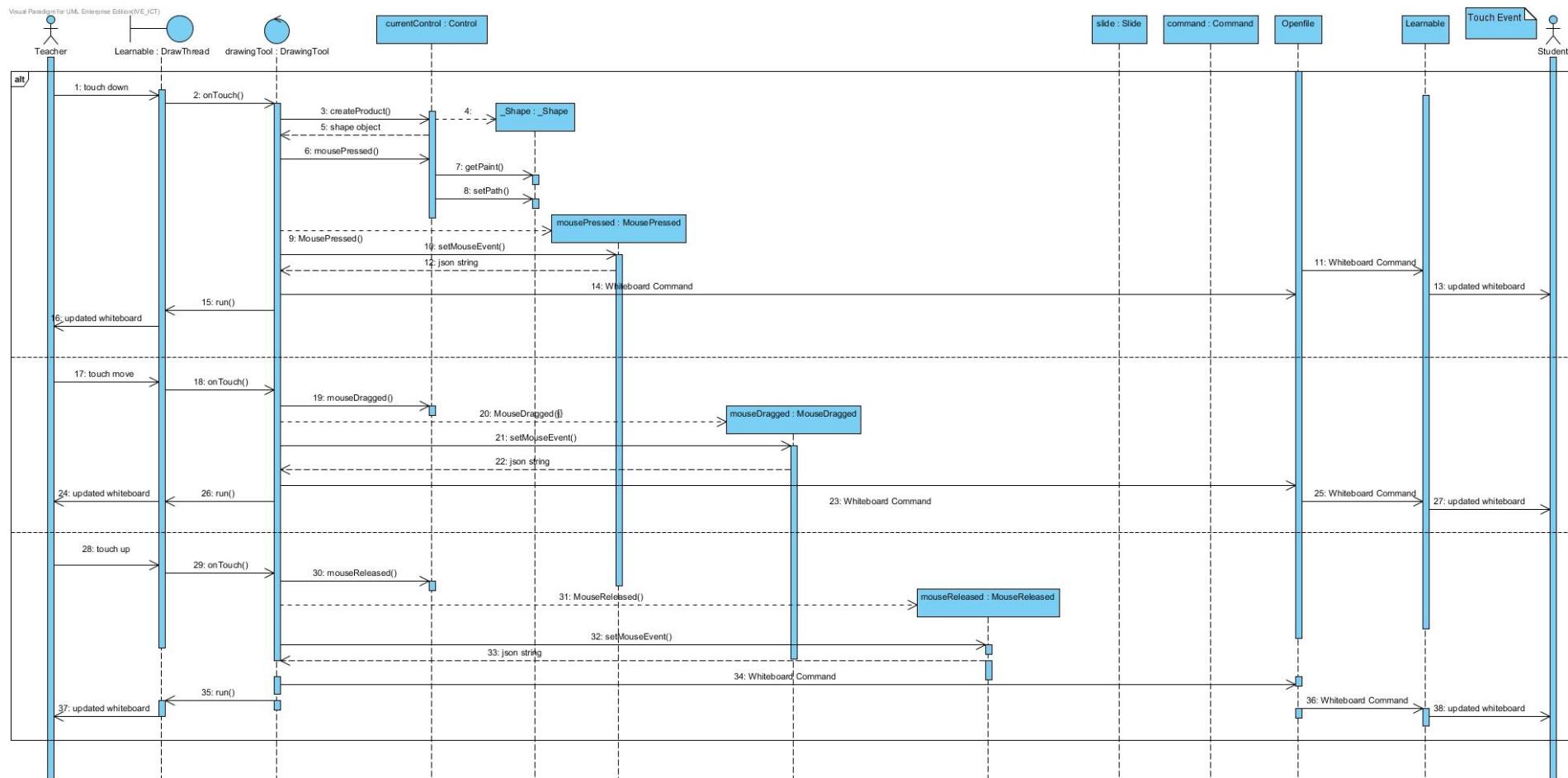
MVC - Drawing Control



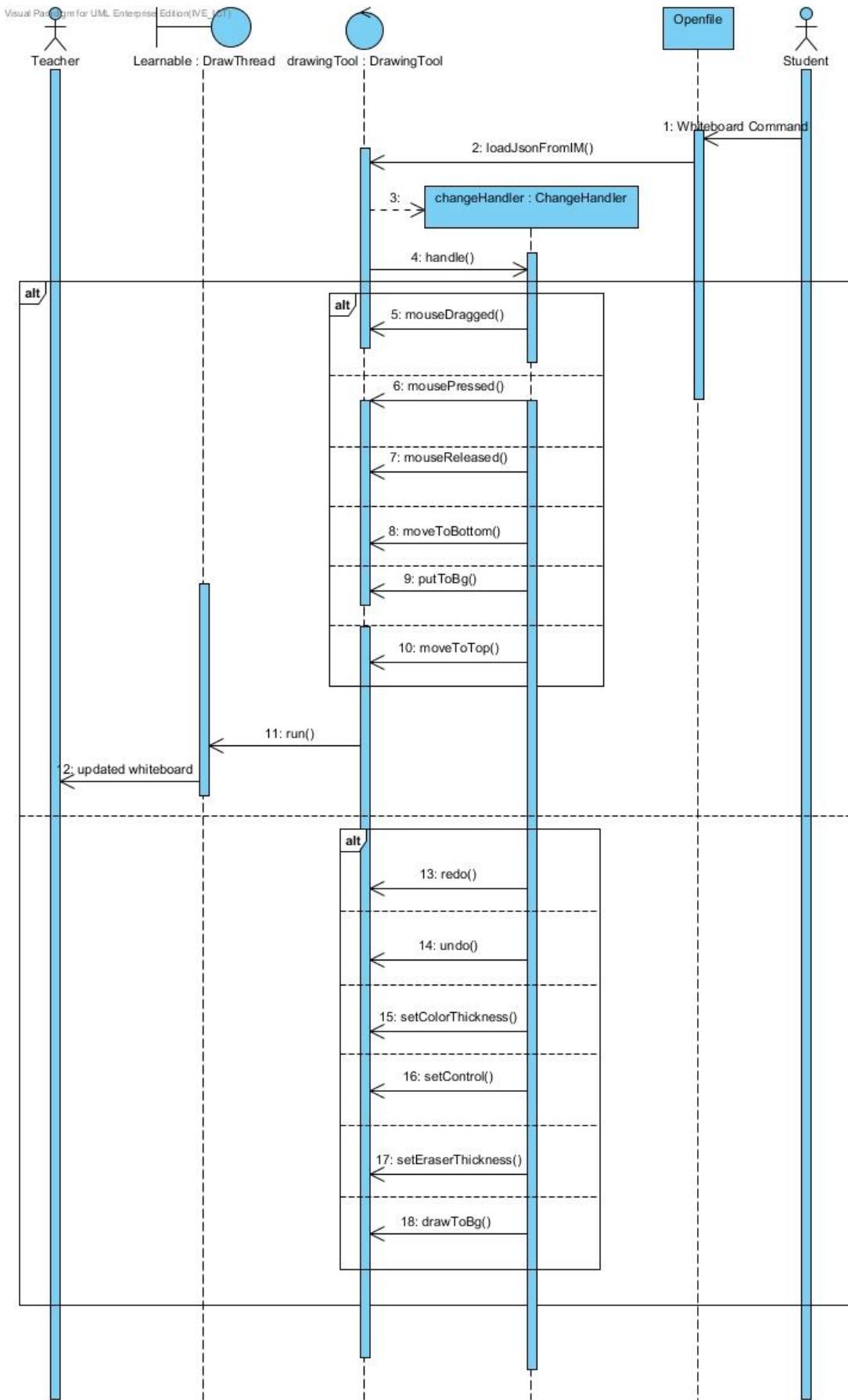
MVC - Normal Action



MVC - sub button - teacher

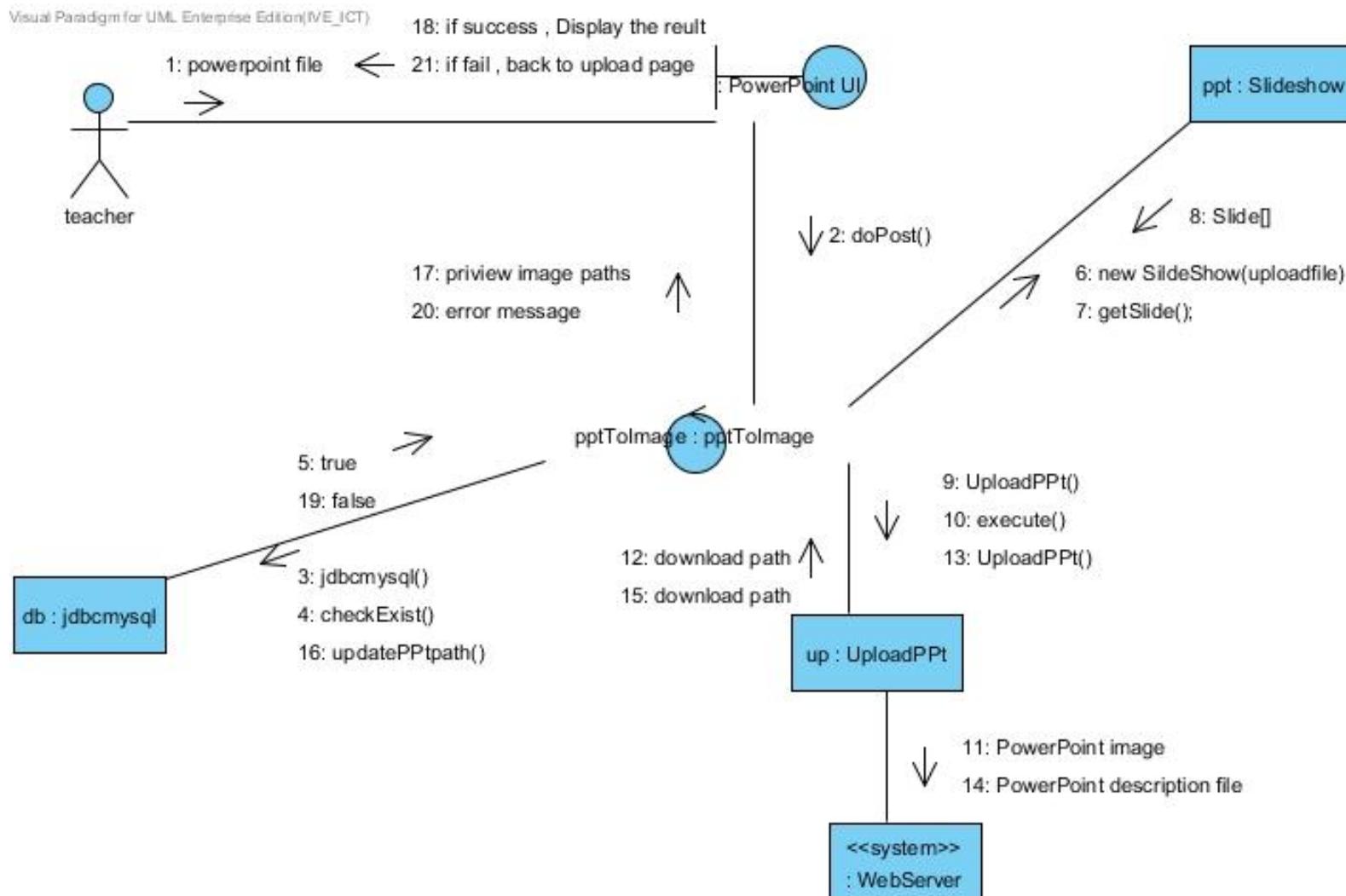


MVC - Touch Event



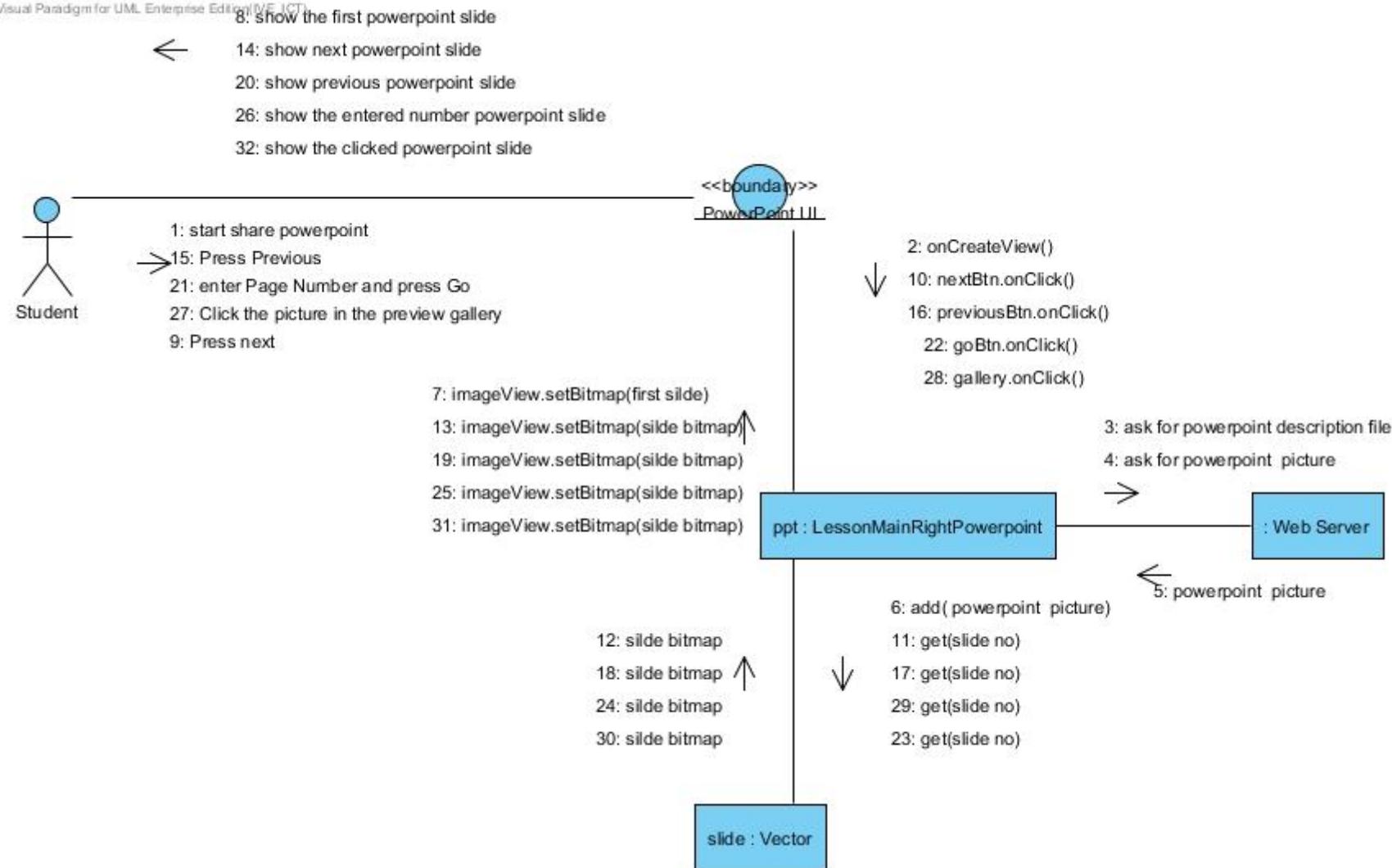
Student WhiteBoard MVC

Object Collaboration Diagram



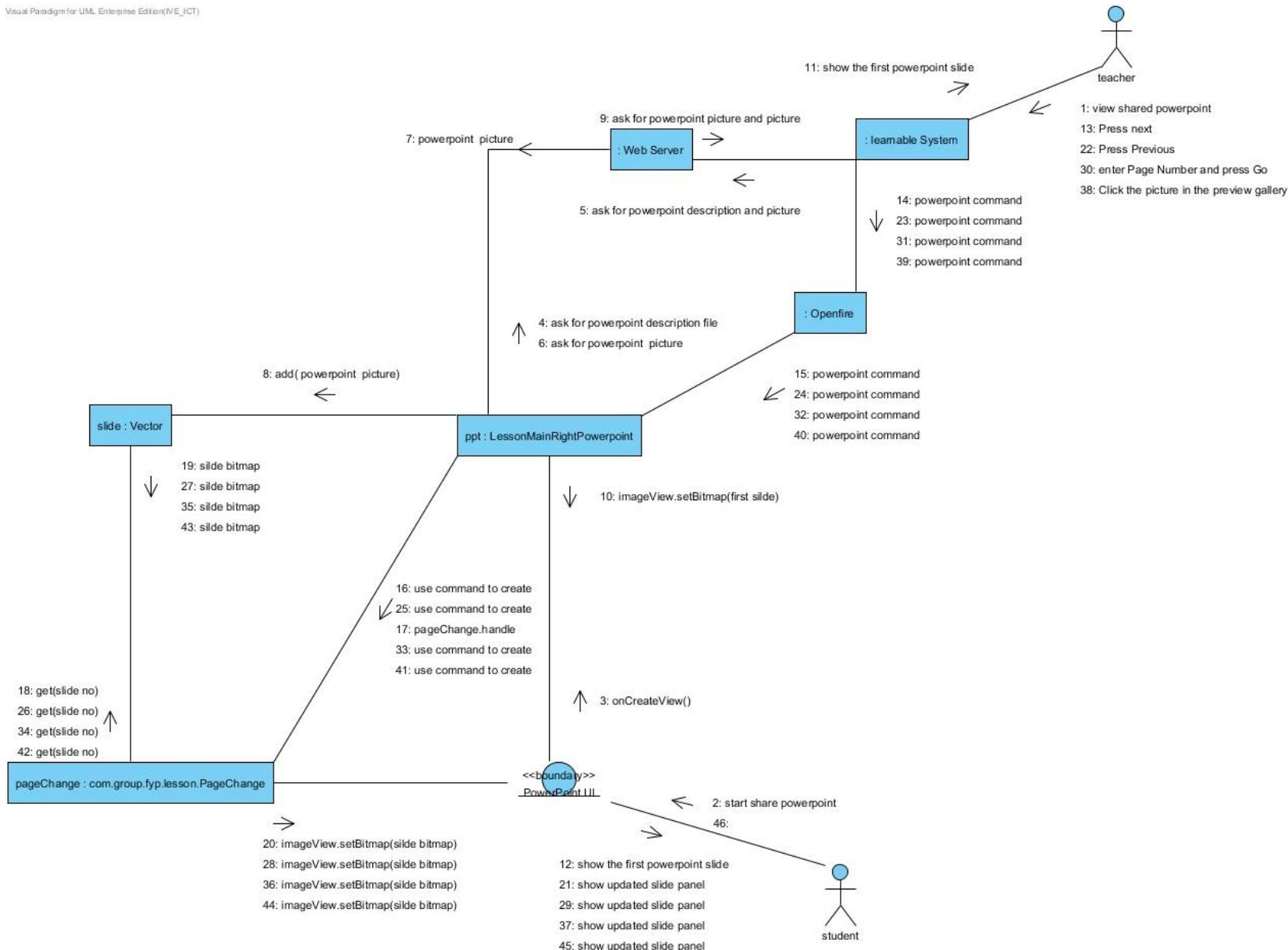
Upload Powerpoint

Visual Paradigm for UML Enterprise Edition(ME JCT)

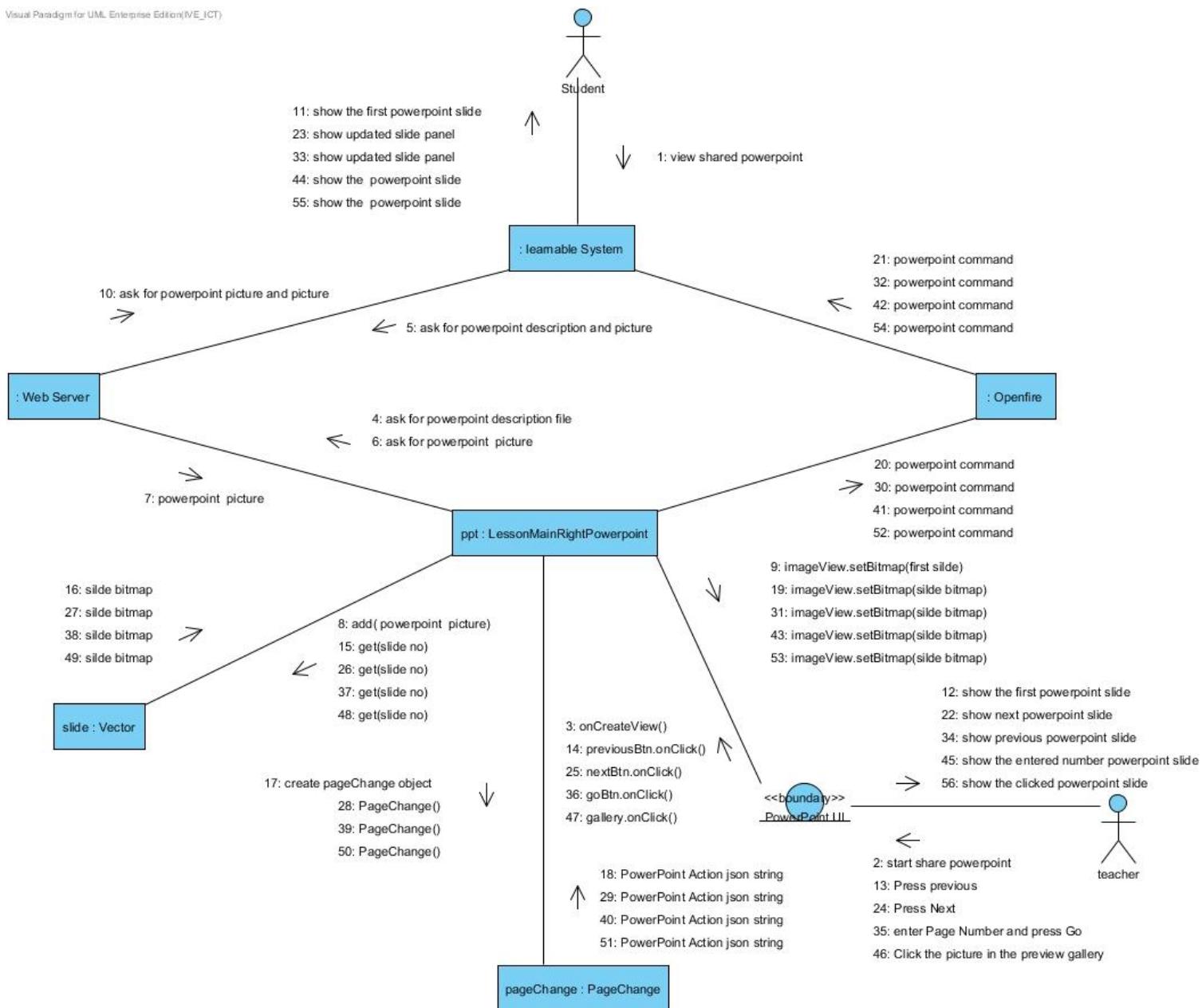


Offline Powerpoint

Visual Paradigm for UML Enterprise Edition(IVE_1CT)

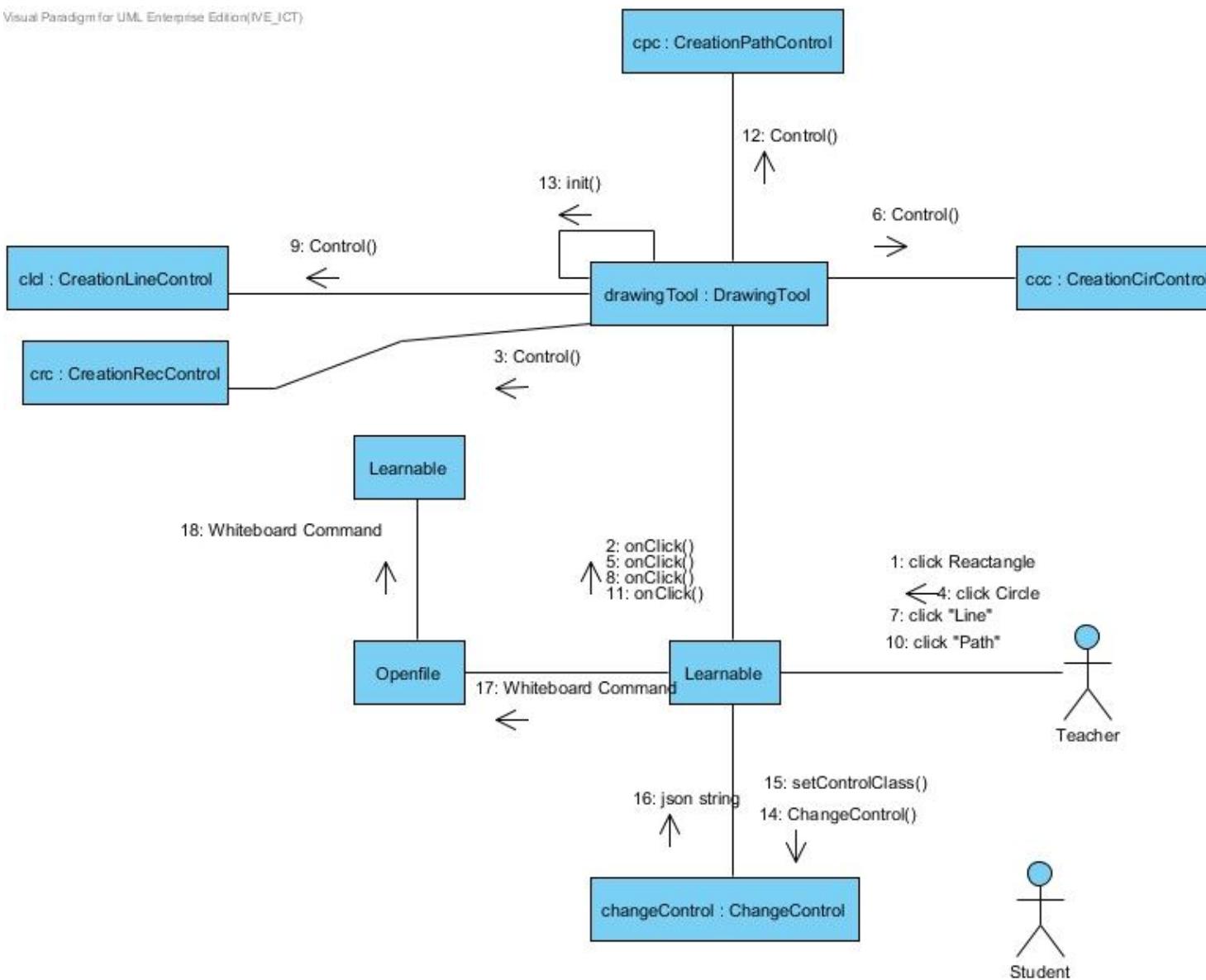


Visual Paradigm for UML Enterprise Edition(IVE_ICT)

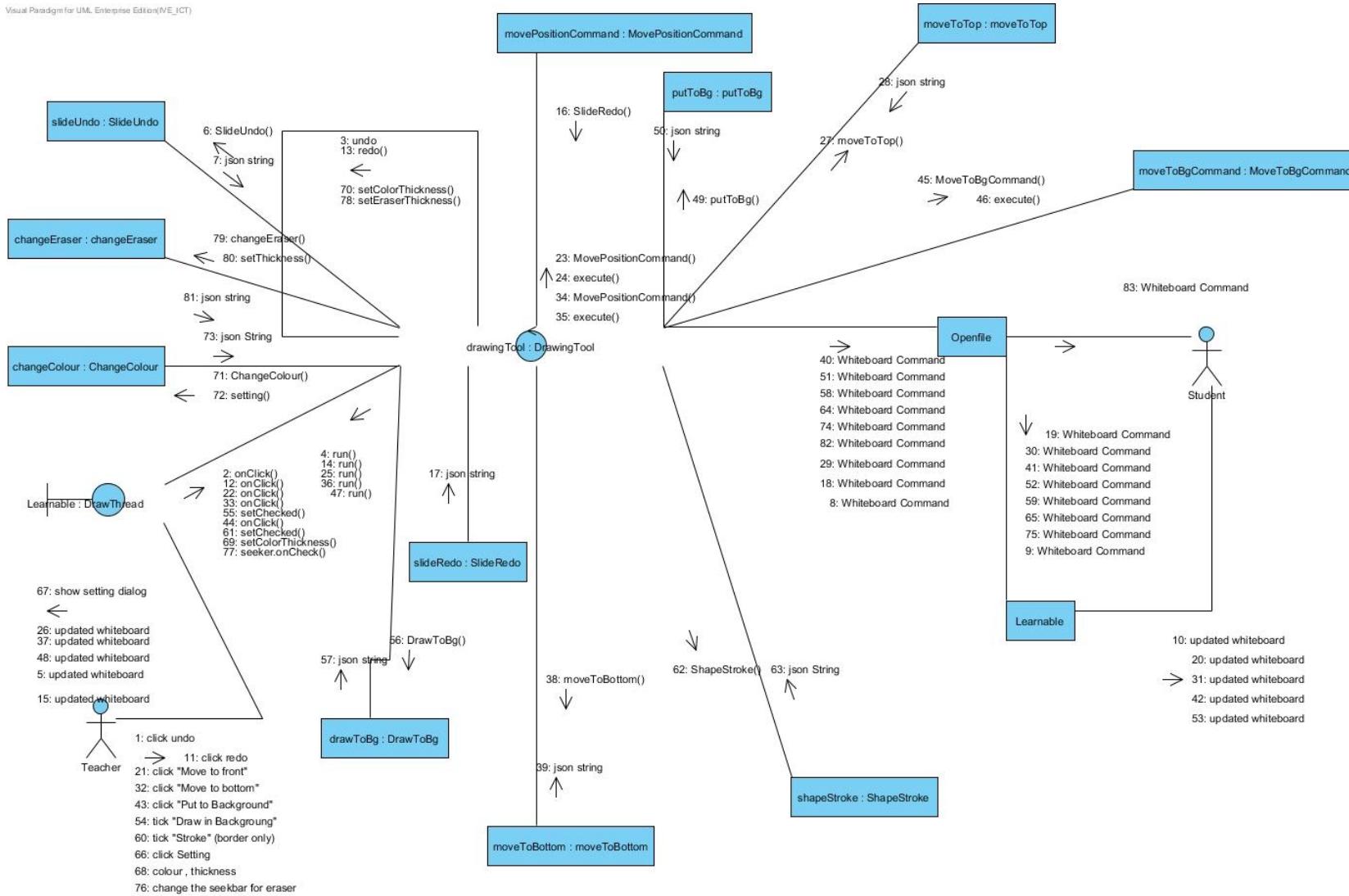


Teacher Online PPT

Visual Paradigm for UML Enterprise Edition(VE_ICT)

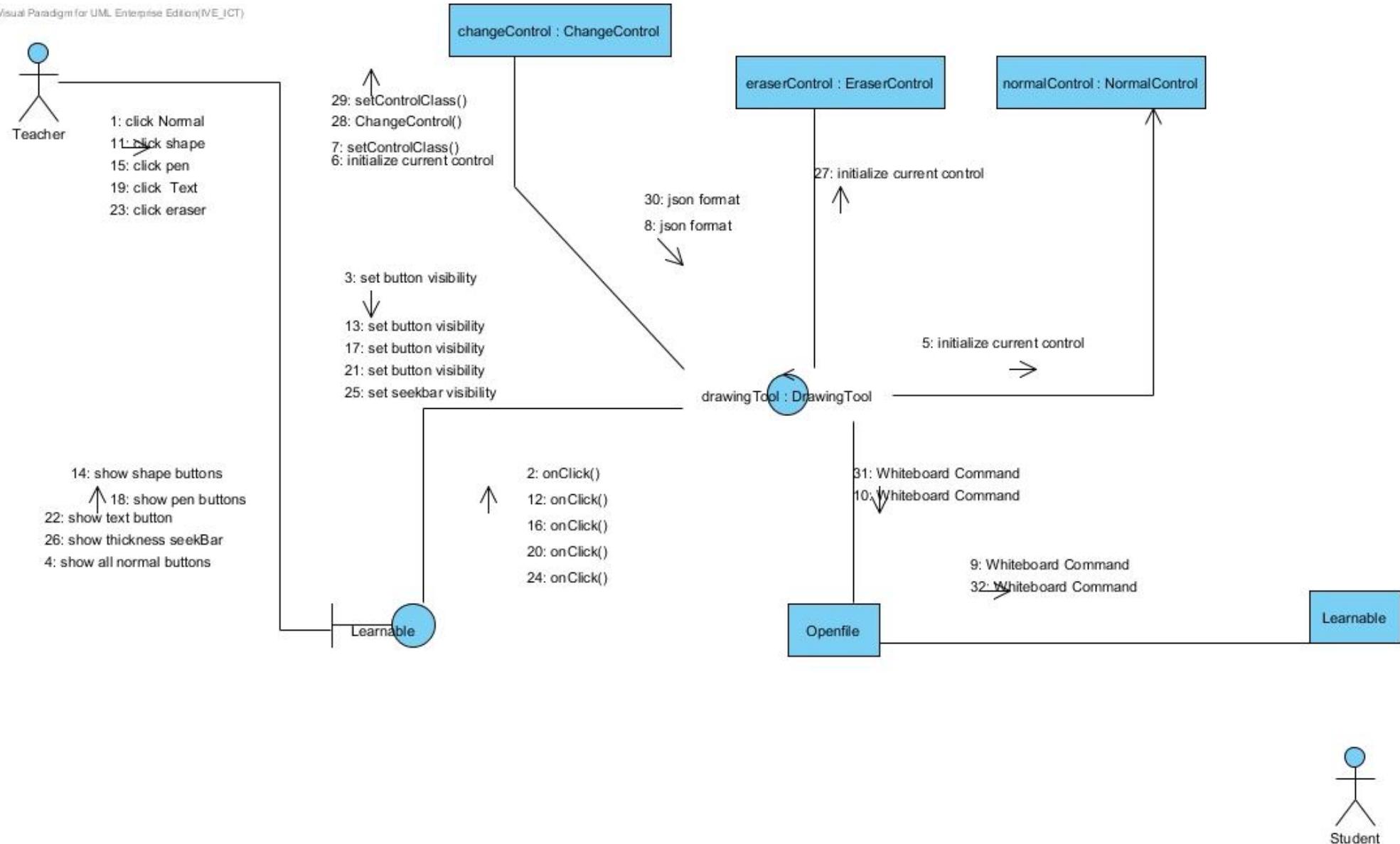


Visual Paradigm for UML Enterprise Edition(VE_ECT)

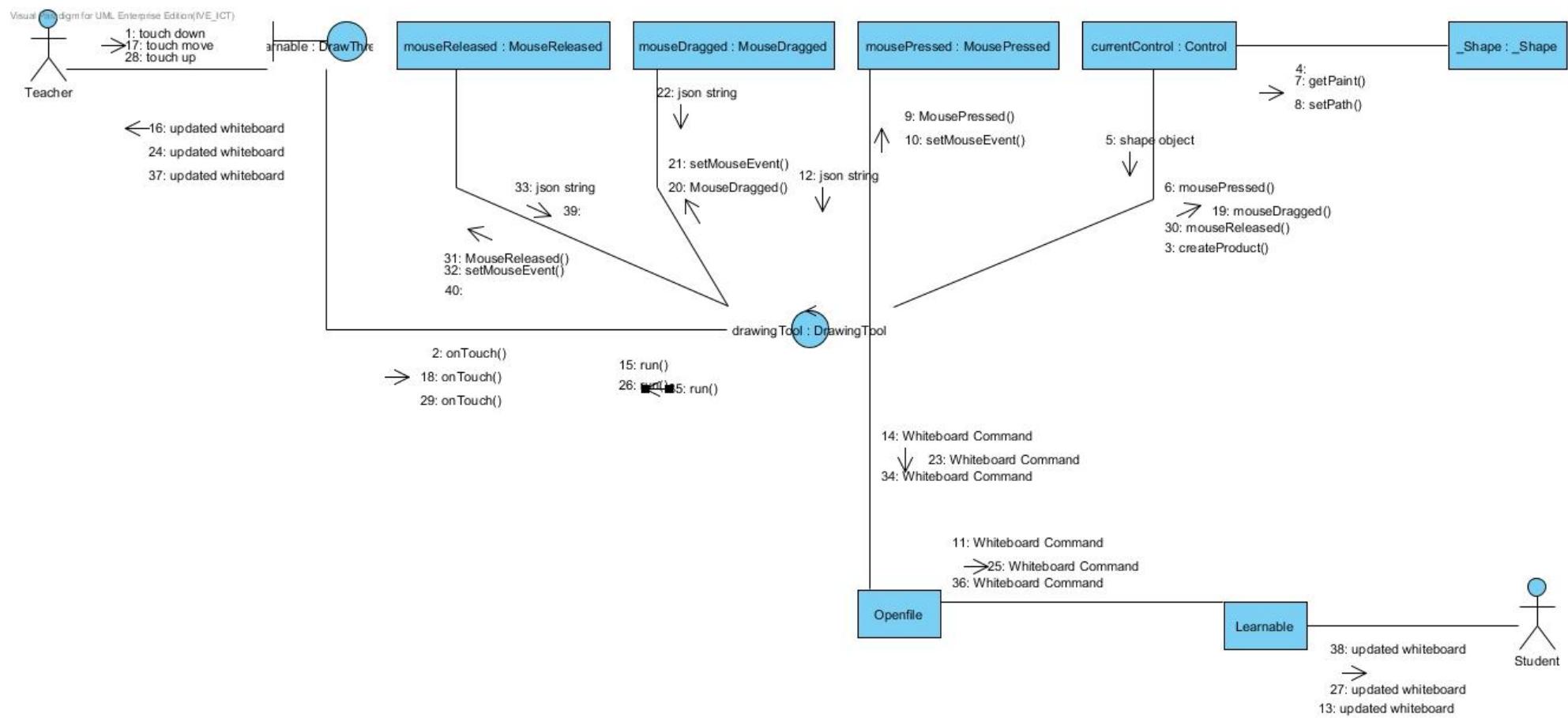


MVC - Normal Action

Visual Paradigm for UML Enterprise Edition(IVE_JCT)

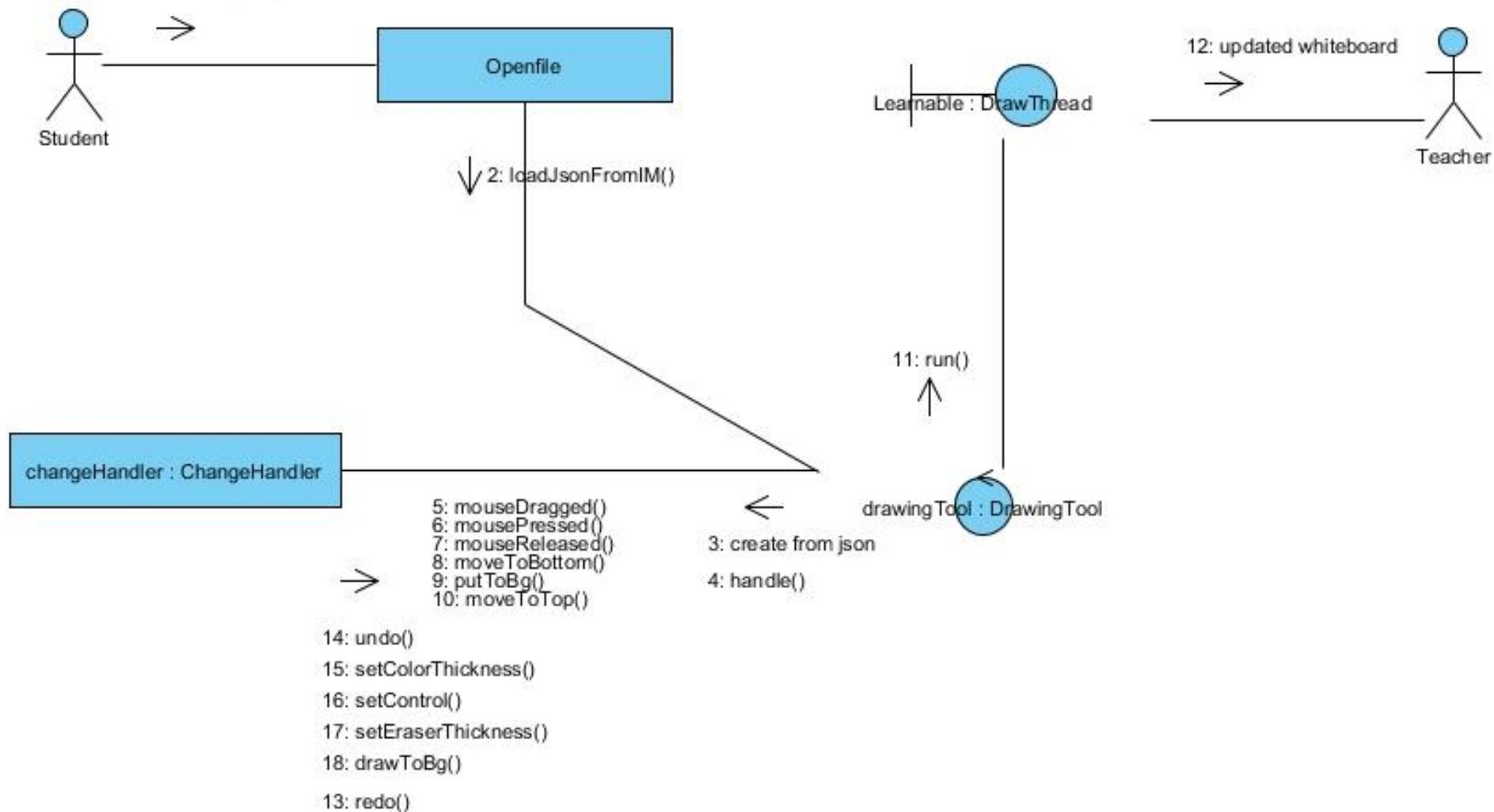


MVC - sub button - teacher

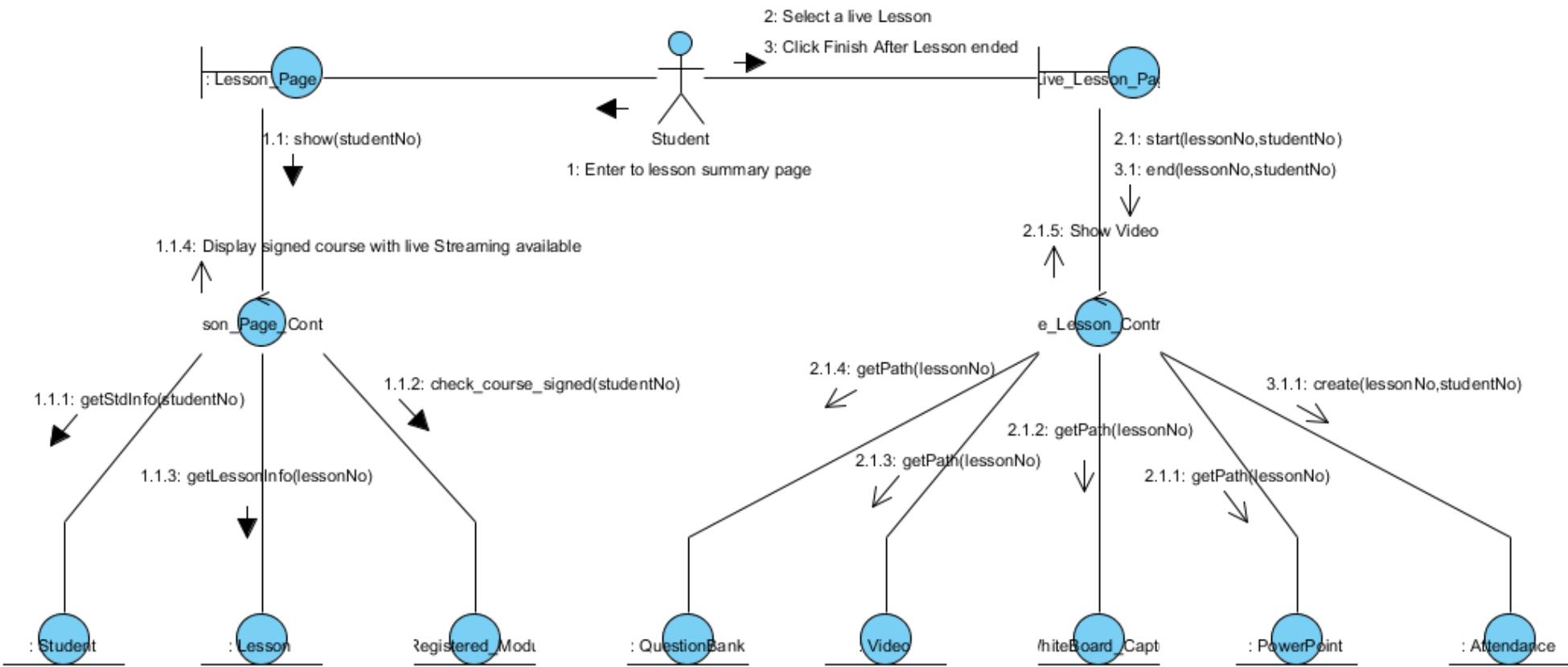


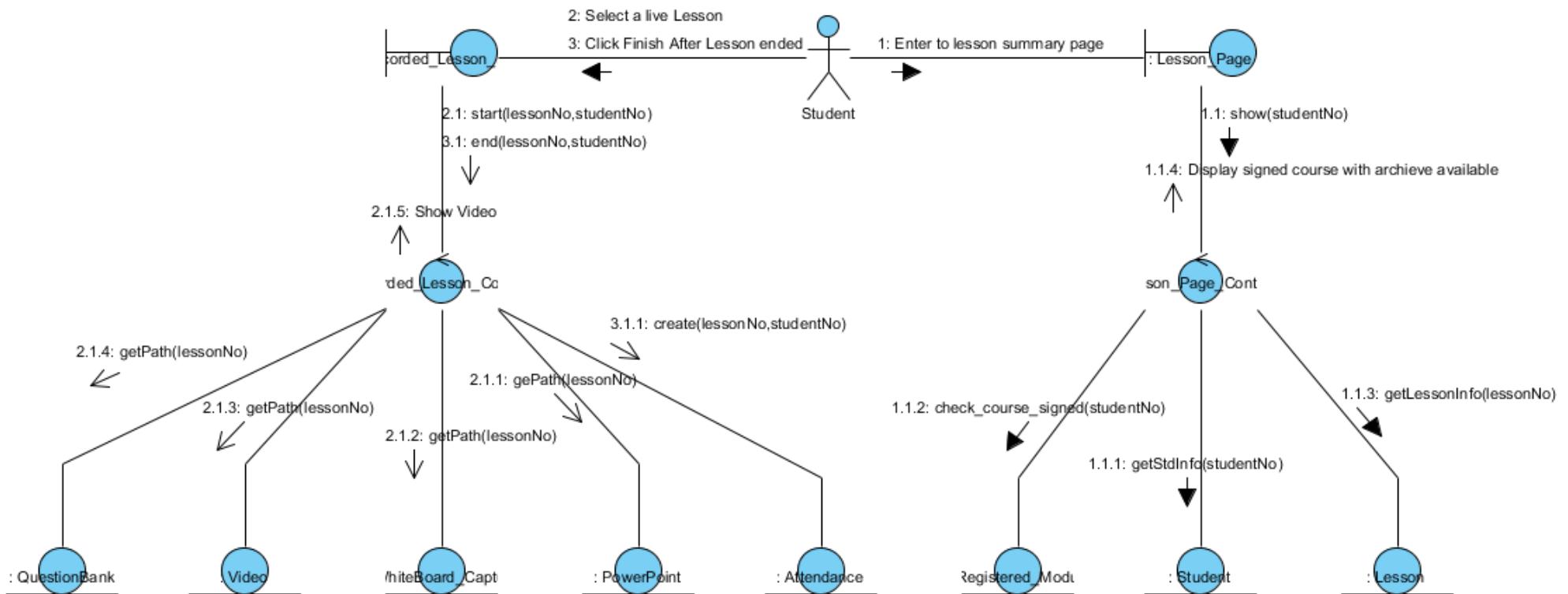
MVC - Touch Event

Visual Paradigm for UML Extension Edition (UML-ICT)
1: Whiteboard Command

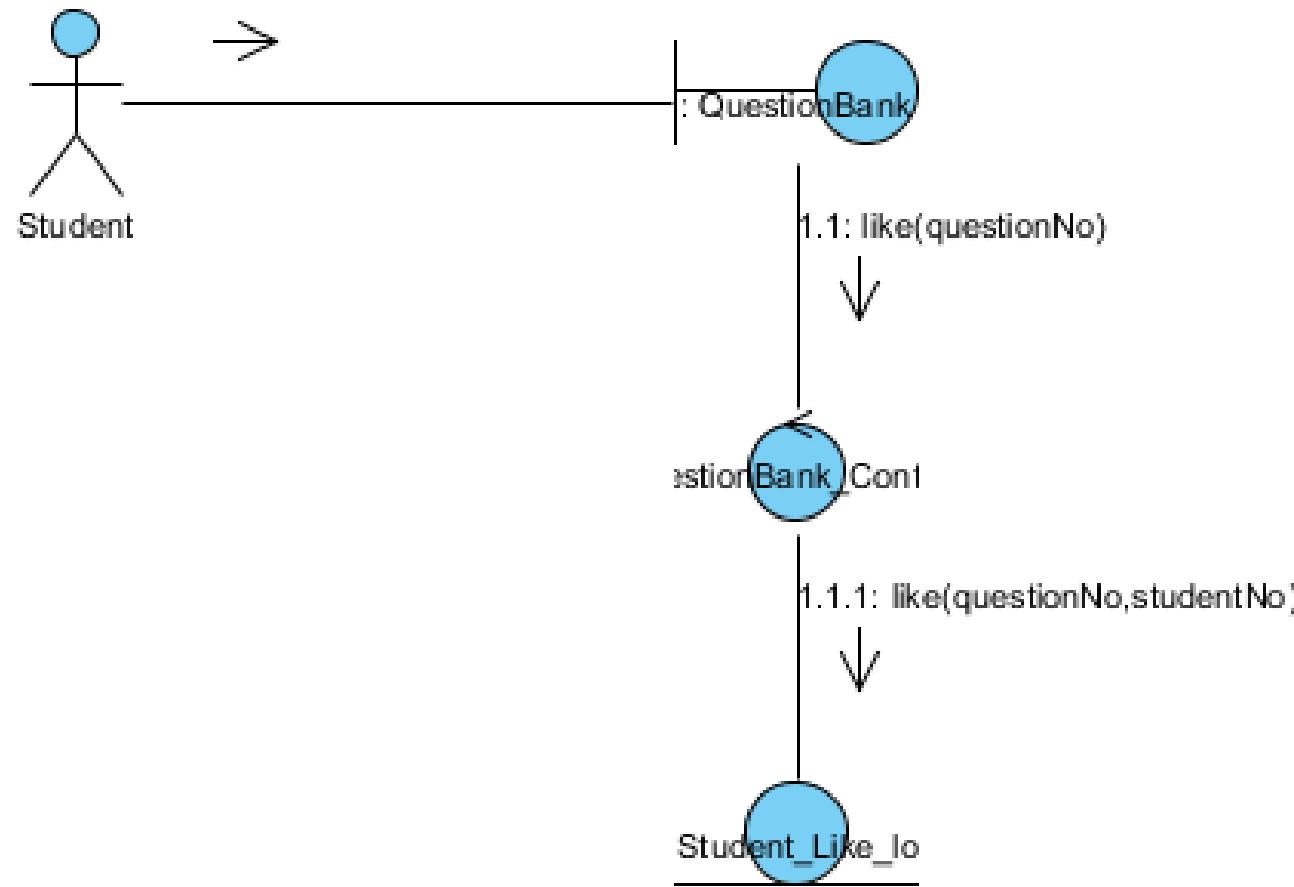


MVC for student receive json - Communications

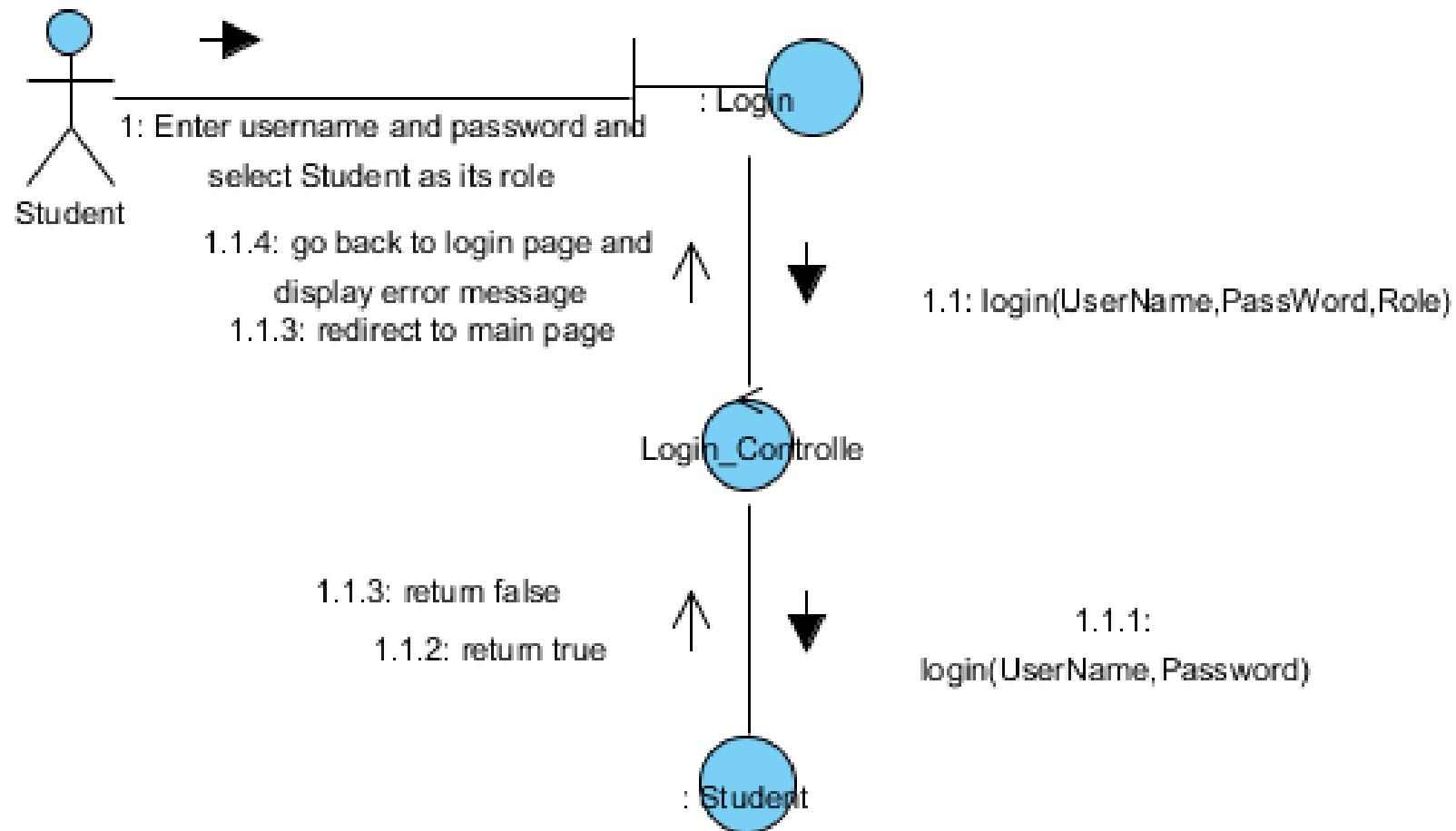




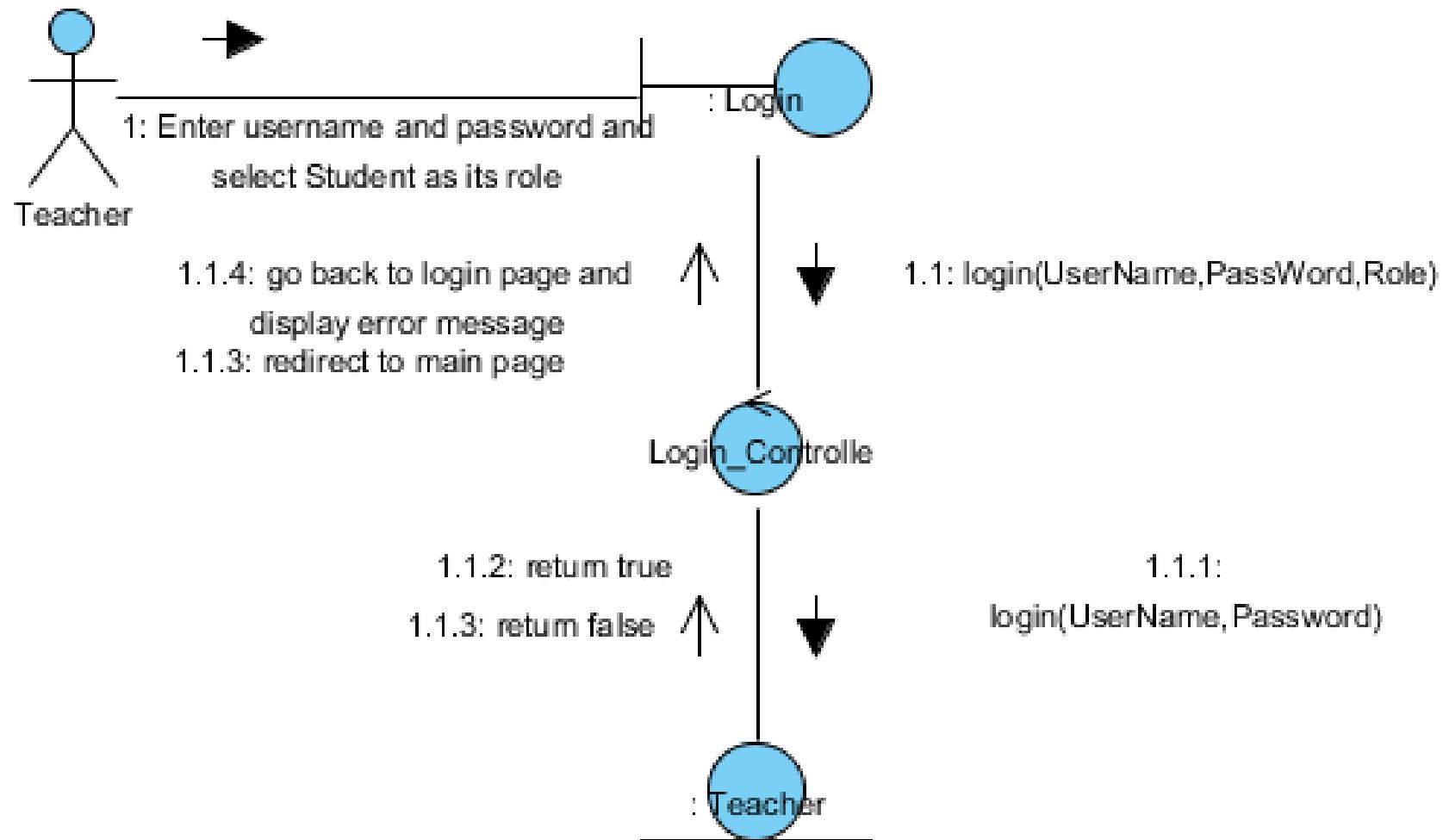
1: Give a like to the Question



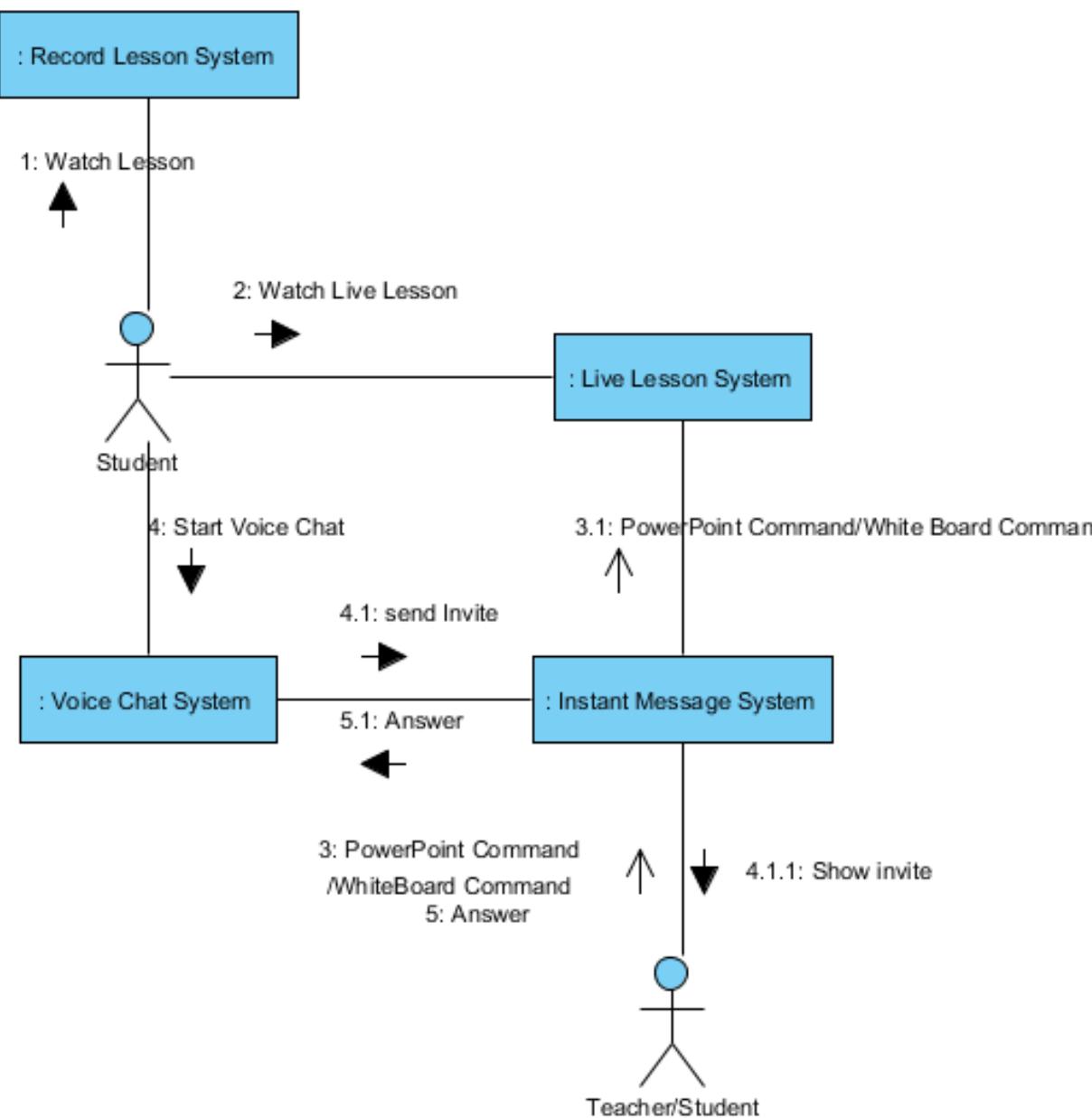
Lke Question



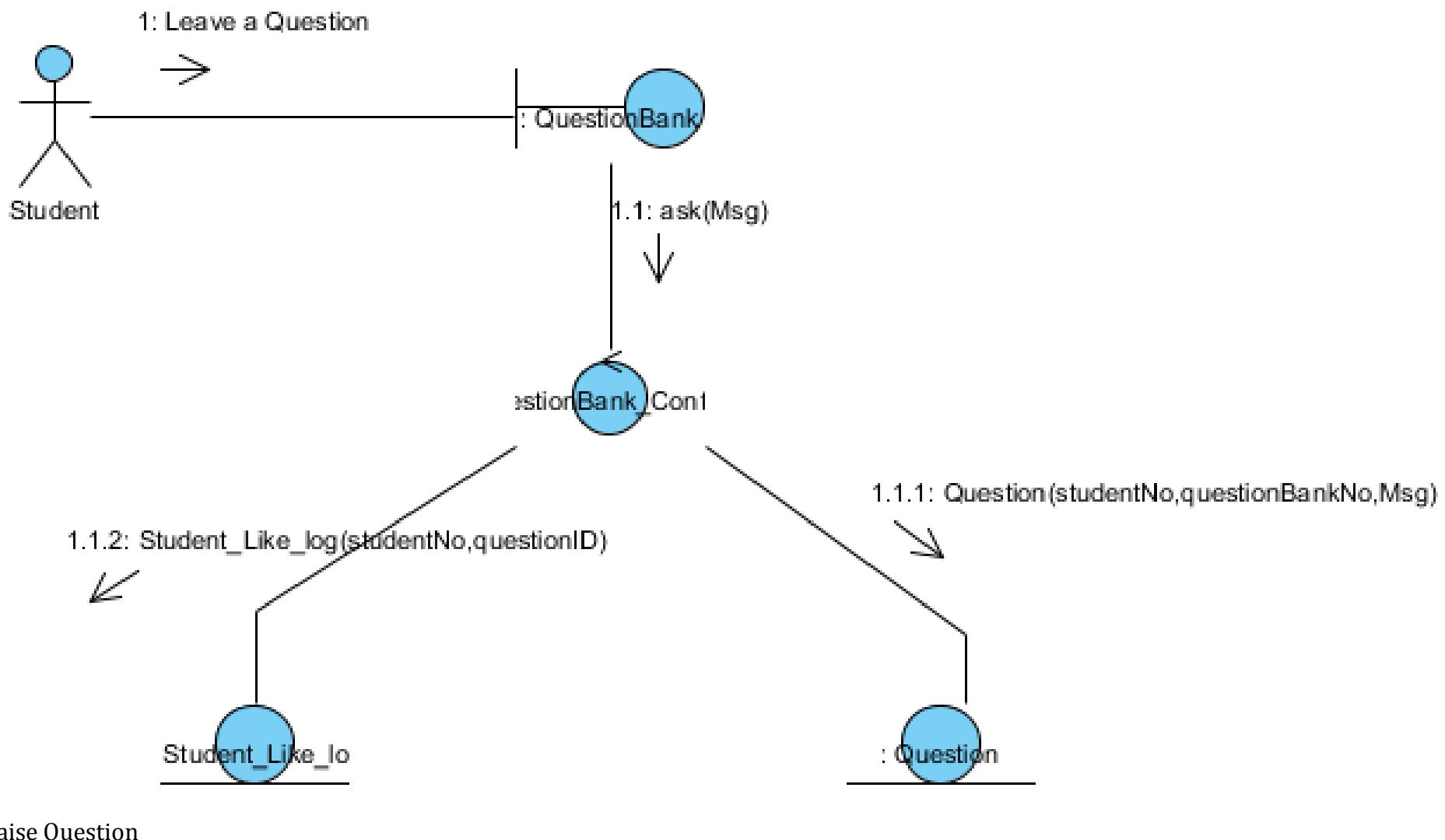
Login Student

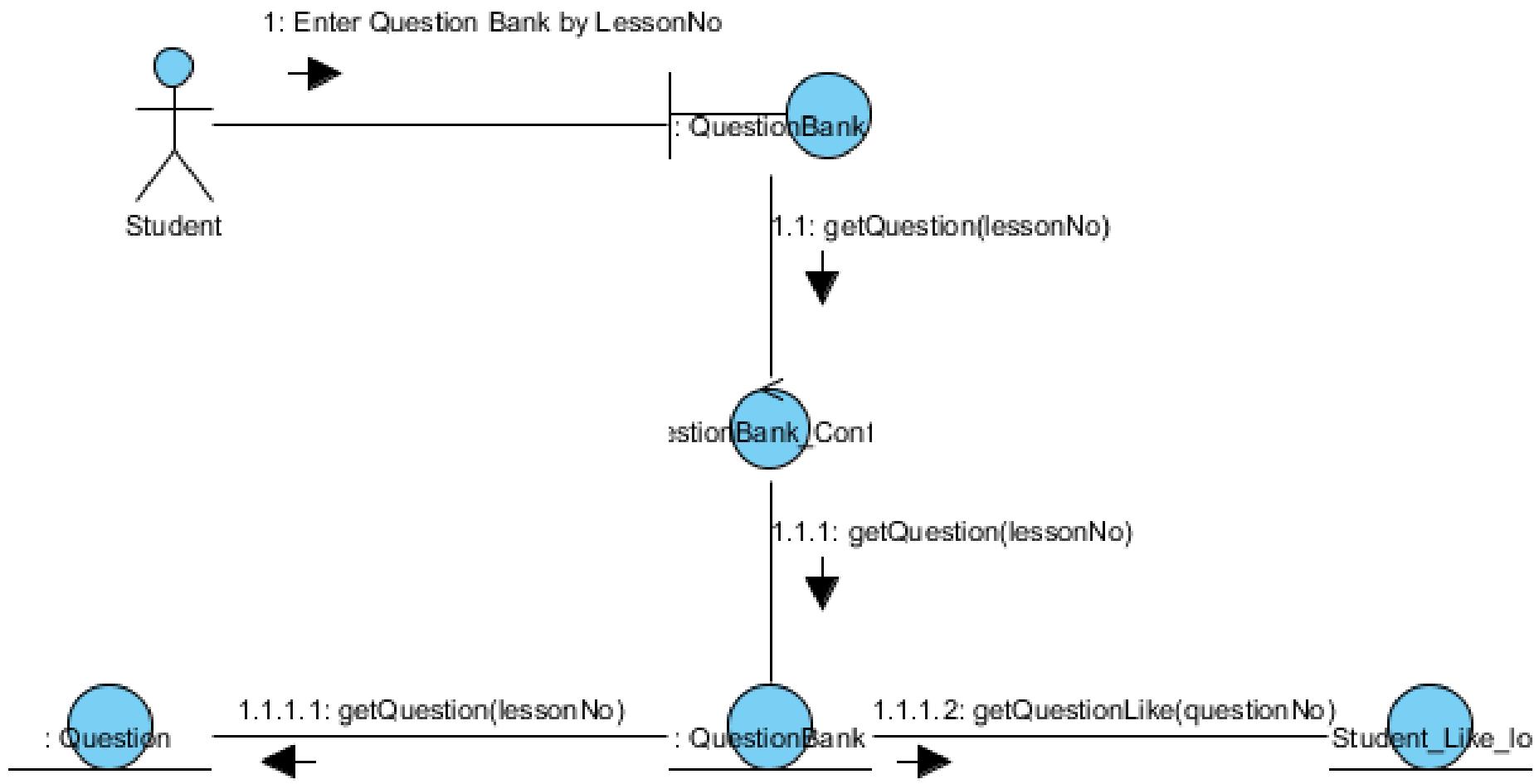


Login Teacher

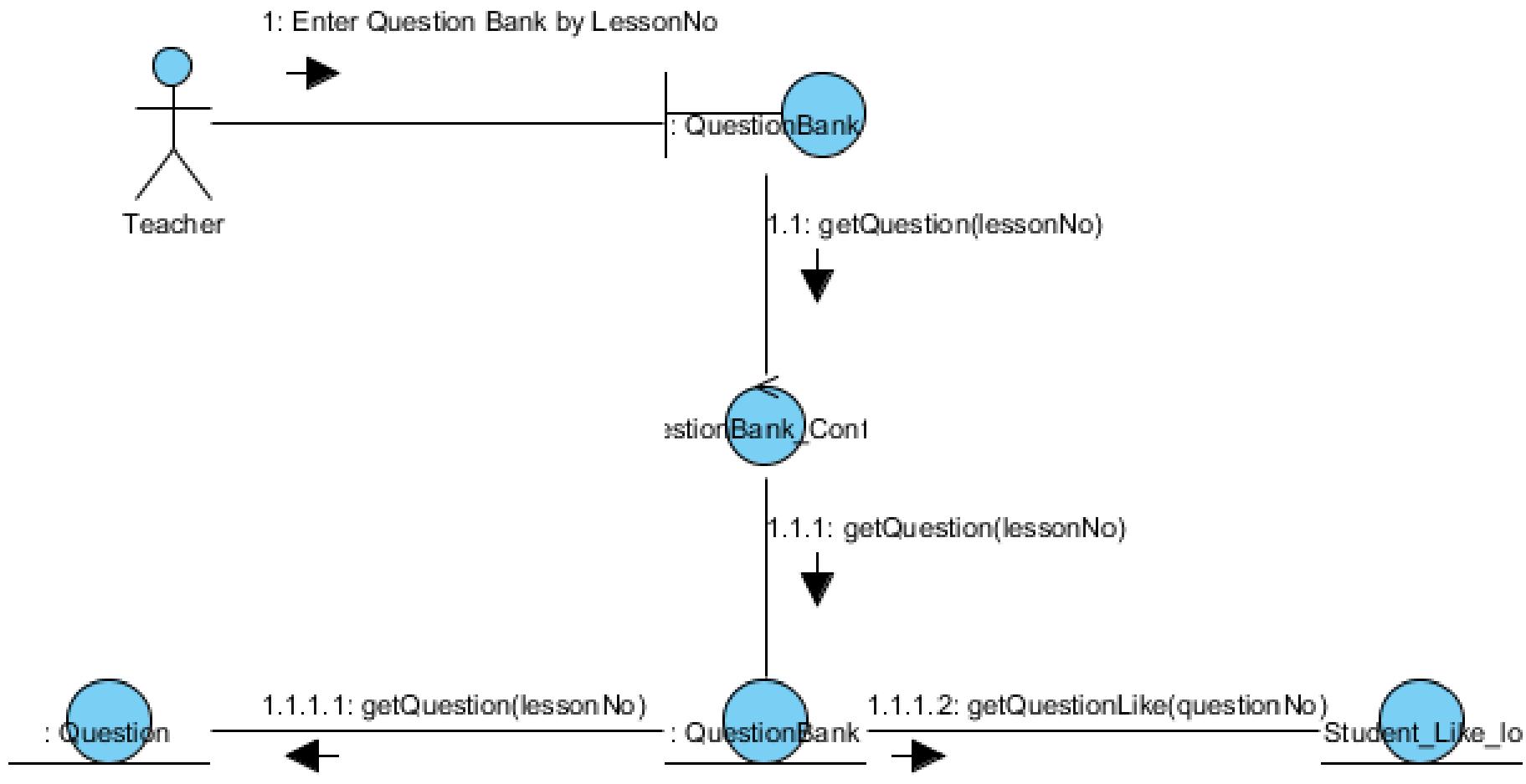


Overview

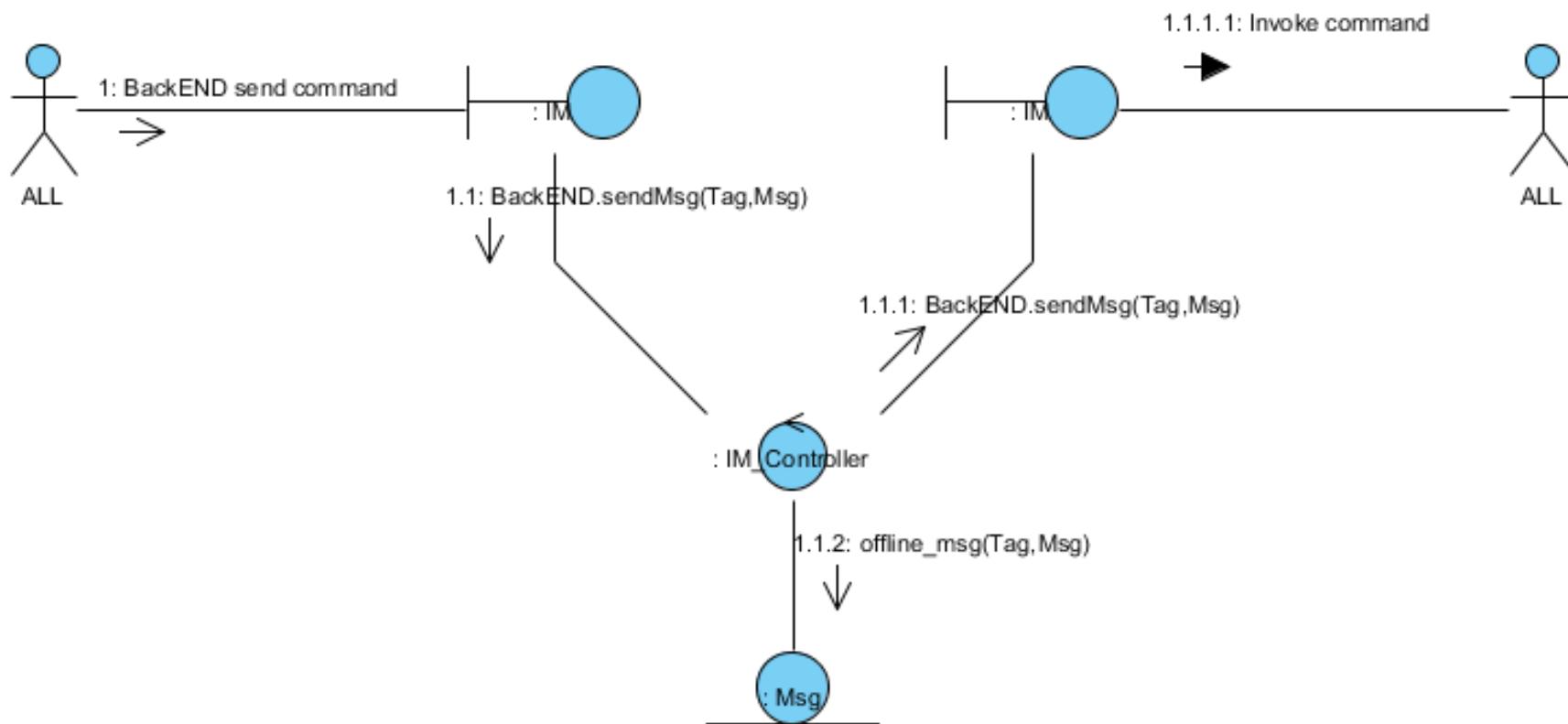




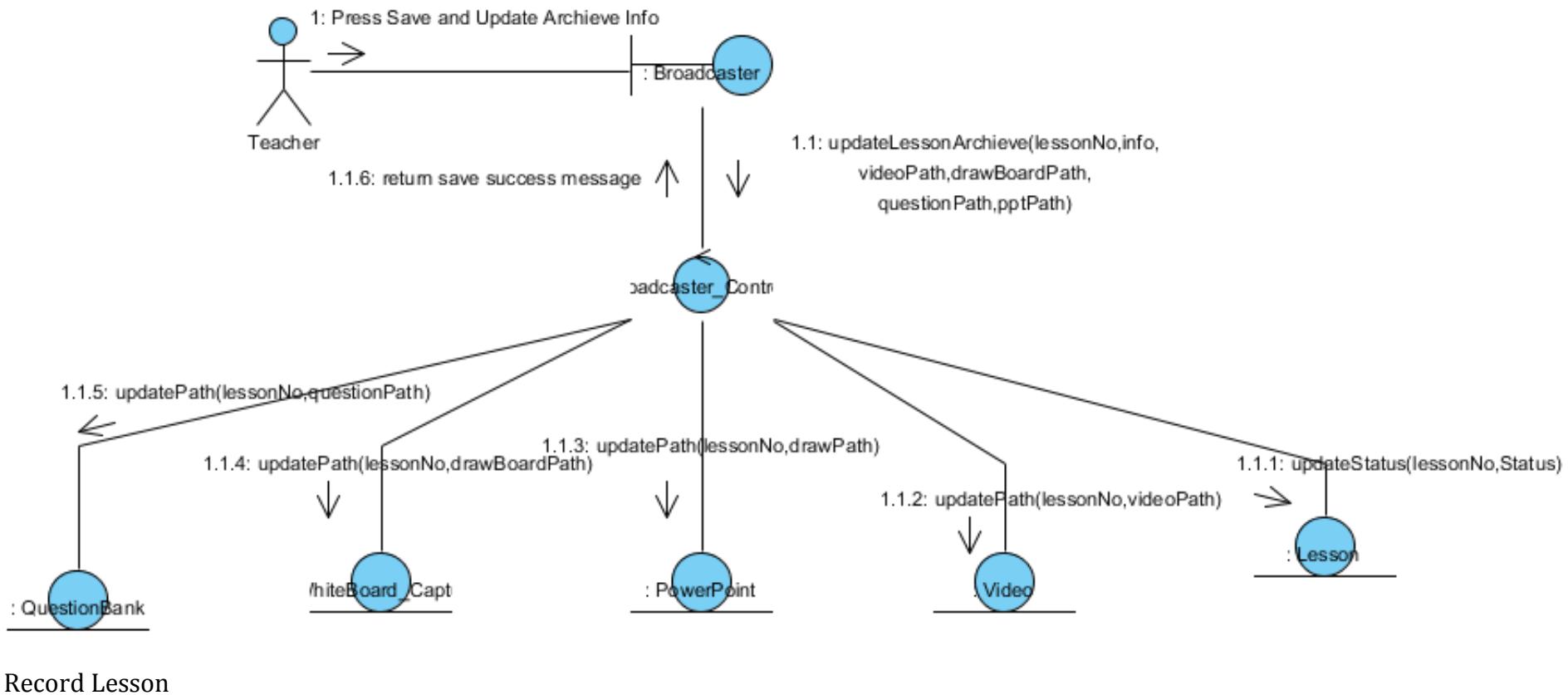
Read Question by Student

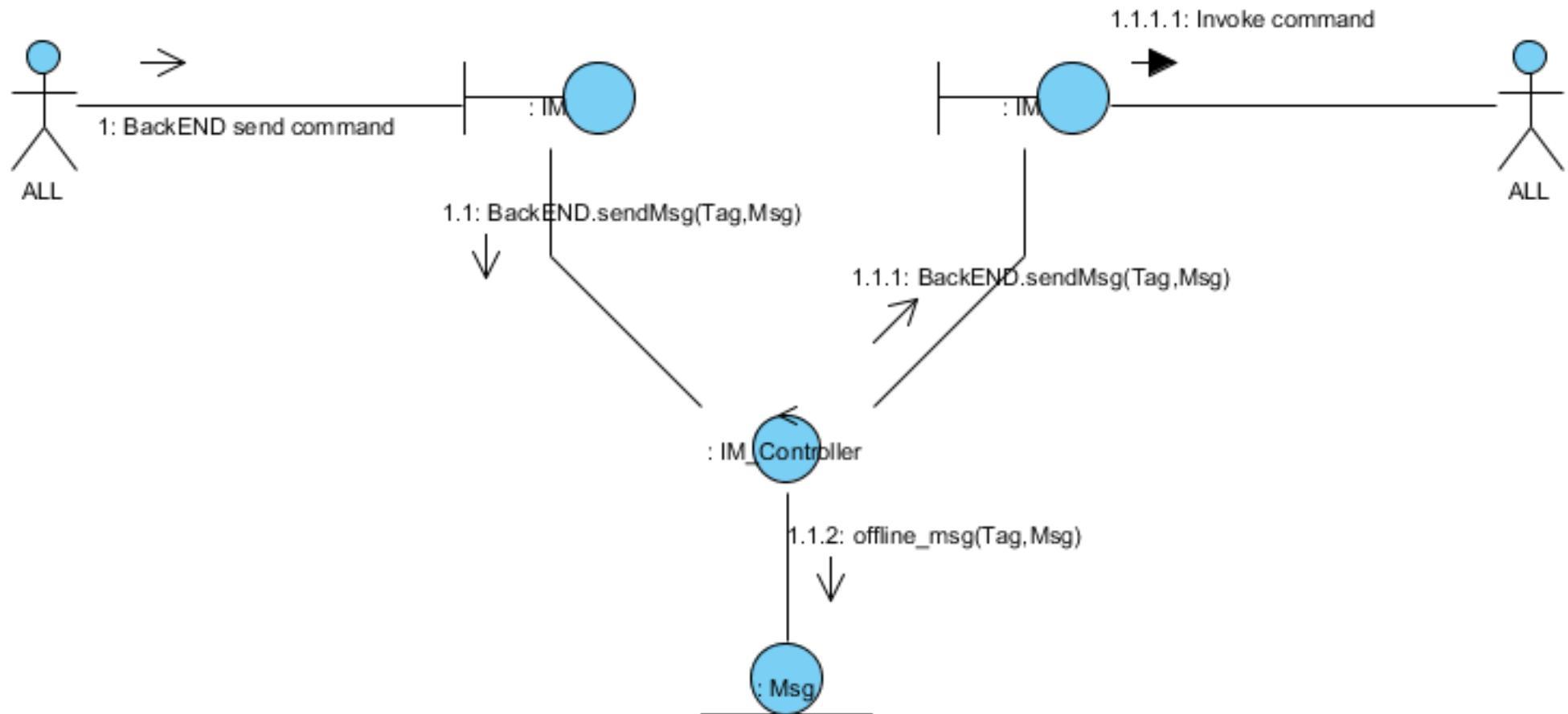


Read Question by Teacher

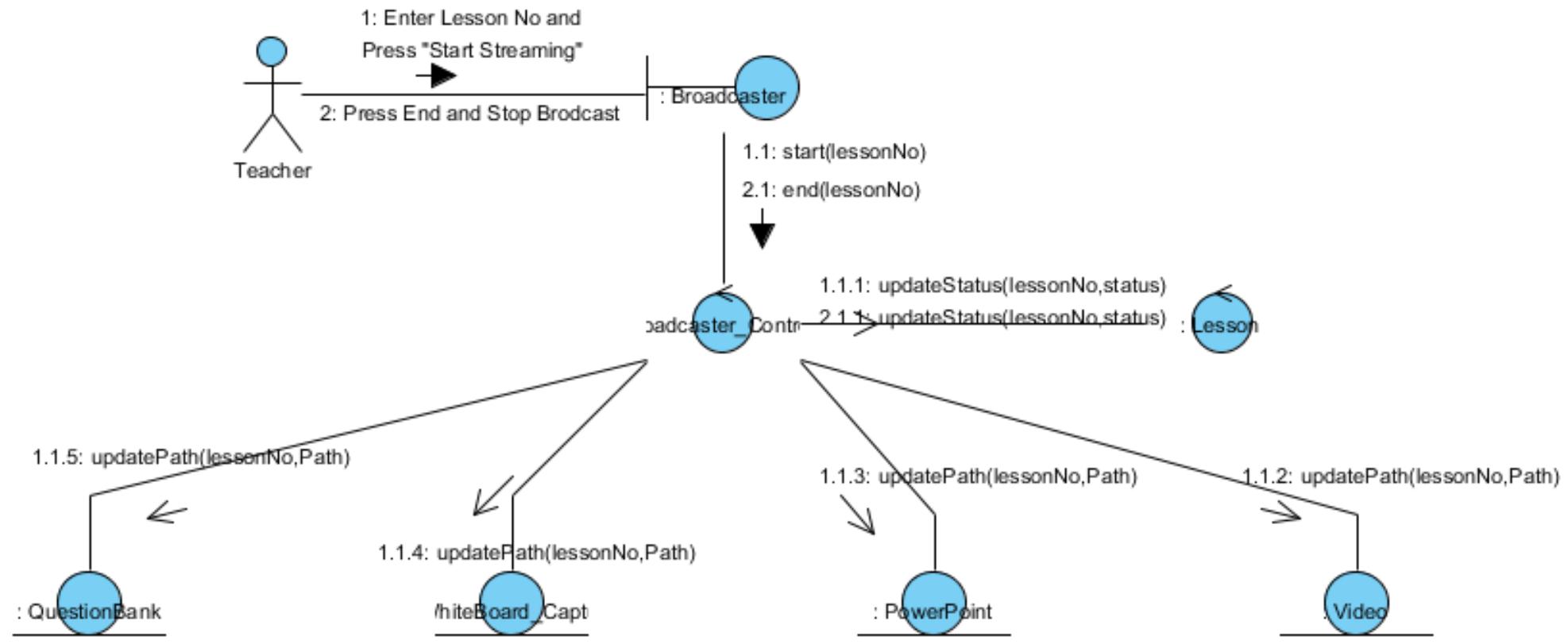


Receive Message

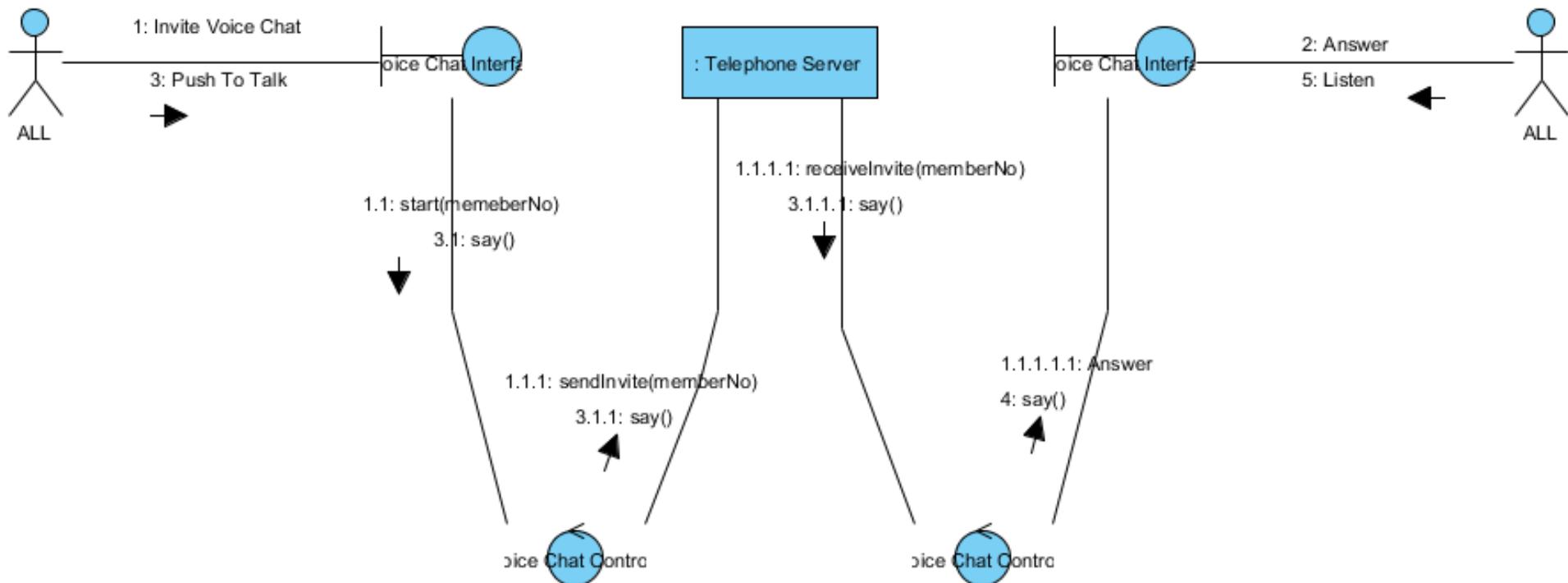




Send Message



Start Live Lesson



Start Voice Chat

Data Dictionary

Course

courseID (PK)	varchar(255)	Not Null
courseName	varchar(255)	Not Null
courseDesc	varchar(255)	Not Null

Lesson

lessonID(PK)	int(10)	Not Null
CoursecourseID(FK)	varchar(255)	Not Null
lessonName	varchar(255)	Not Null
lessonDesc	varchar(255)	Not Null
lesson_chatRoom	varchar(255)	Null
lesson_pic_url	varchar(255)	Null
lesson_video_url	varchar(255)	Null
lesson_question_url	varchar(255)	Null
lesson_ppt_url	varchar(255)	Null
lesson_available	int(1)	Not Null
lesson_time	int(8)	Not Null

lesson_memeber

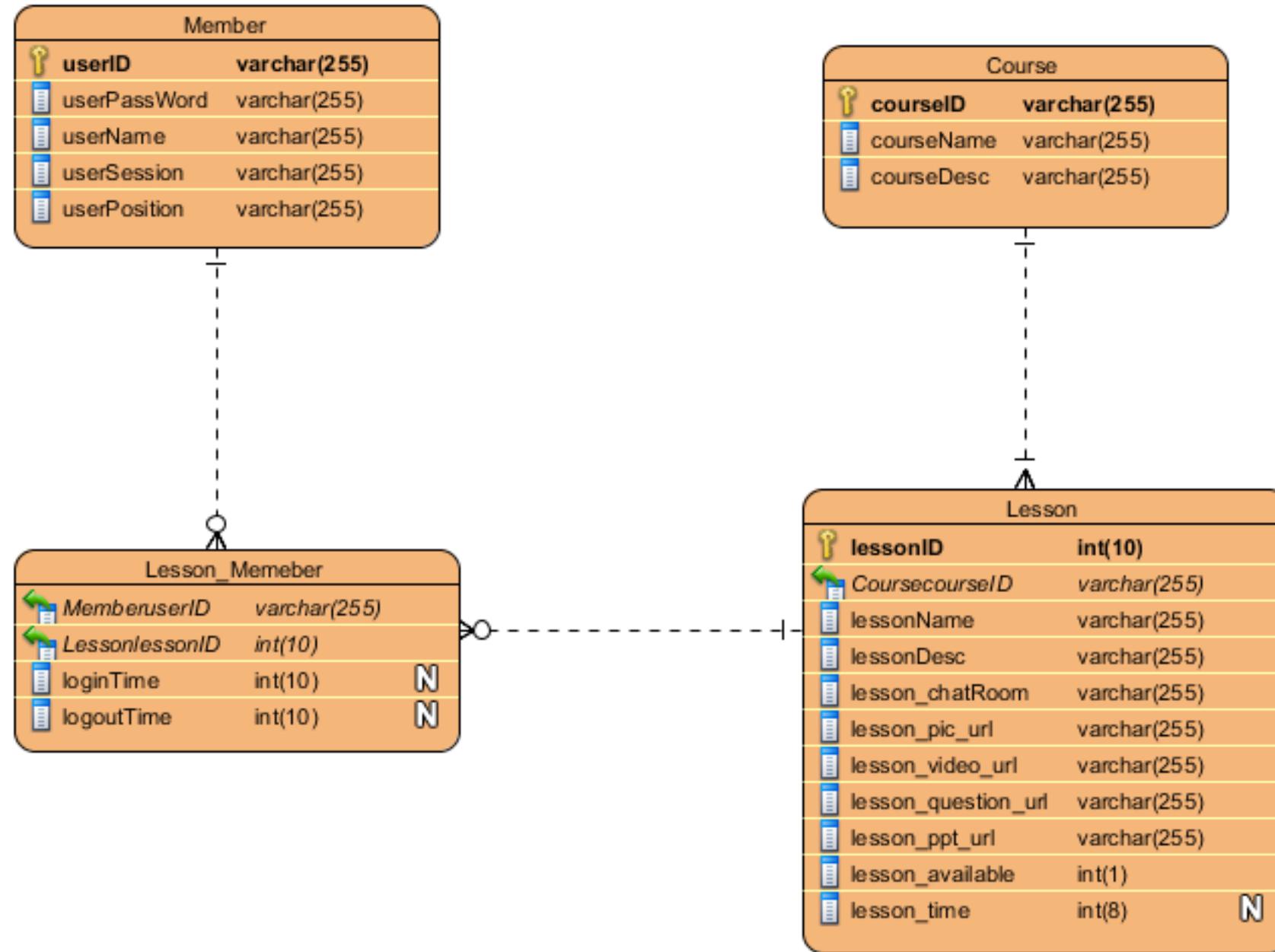
MemberuserID(PK)	varchar(255)	Null
LessonlessonID(FK)	int(10)	Null
loginTime	int(10)	Not Null
logoutTime	int(10)	Not Null

Member

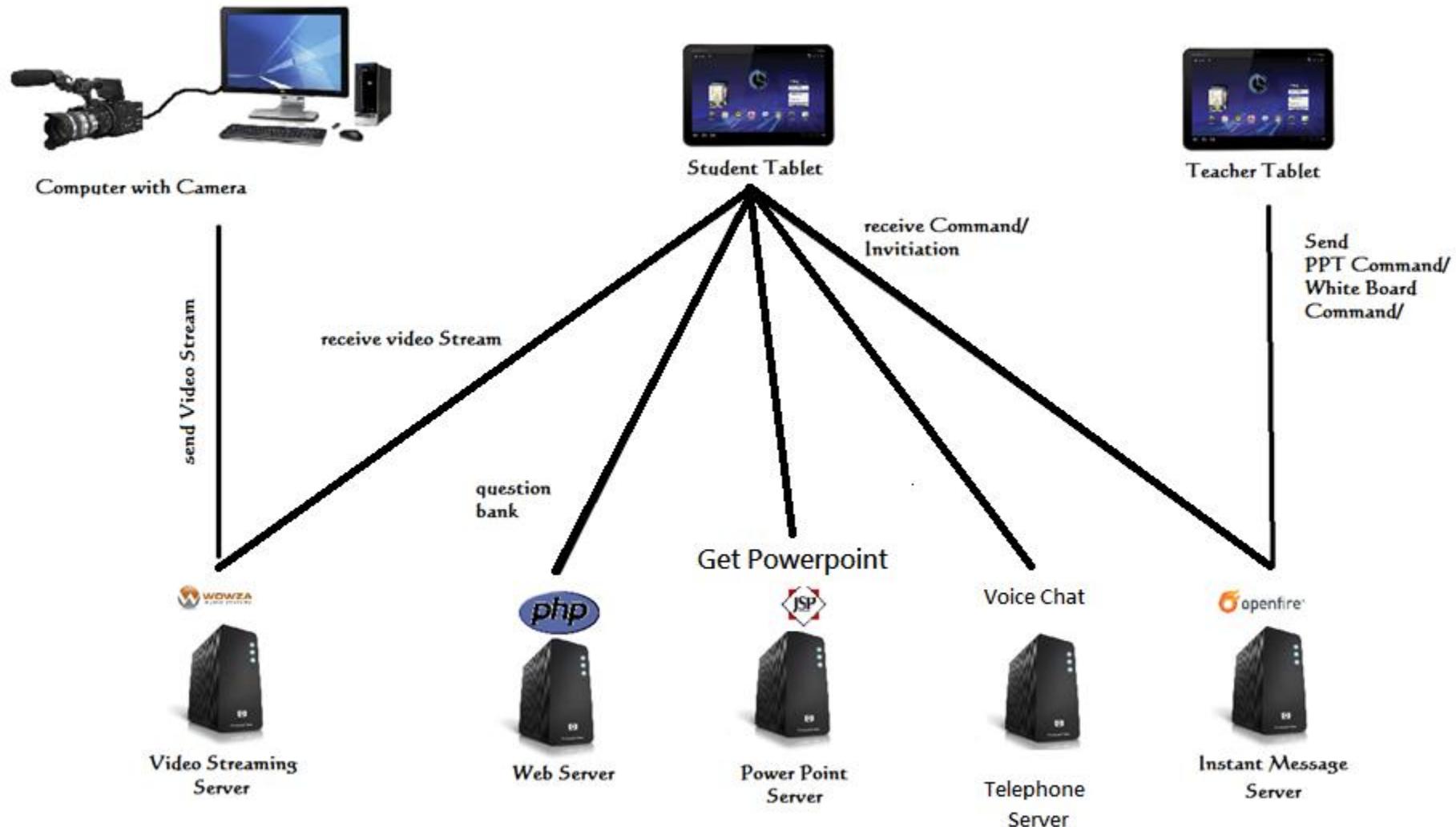
userID(PK)	varchar(255)	Not Null
userPassWord	varchar(255)	Not Null
userName	varchar(255)	Not Null
userSession	varchar(255)	Not Null
userPosition	varchar(255)	Not Null

Documentation for detailed design

- data design, software/hardware architectural design (system design)
- procedural design (module)
- user interface design



Data Design

Software/Hardware architectural design(System Design)

- *procedural design (module)*

IM Service



Smack 3.2.2

Easy to use Java XMPP client library.



Voice Chat Service

package
android.net.sip

BackEnd Communicate Service



PowerPoint Service



Apache POI

We need three type of Client

Teacher Tablet

Teacher can start a lesson, that mean teacher will use video streaming function, white board function, PowerPoint function , question bank function etc. It will send the command to the Instant Message Server to call Student tablet for synchronization.

Also teacher can send video chat invitation to student, invitation will pass by instant message Server to transfer message. Audio Stream will also pass through Video Streaming Server.

Student Tablet

When attend a lesson, that mean student will use video streaming function, white board function, PowerPoint function , question bank function etc. It will receive the command from Instant Message Server for synchronization.

Also student can send video chat invitation to other classmate or teacher, invitation will pass by instant message Server to transfer message. Audio Stream will also pass through Video Streaming Server.

Operating Computer with Camera

Connect the computer with camera, go online and connect to Video Streaming Server. Student then now get the link and play it in Tablet.

We need four type of Server

Video Streaming Server

Provide RTMP and RTSP connection, support web/android/IOS platform streaming.

It is responsible for streaming audio of video conference and live video streaming of lesson.

Web Server

Provide web interface, support PHP and MySQL.

It is responsible for question bank.

Power Point Server

Provide power point data processing. Server is responsible for breaking the power point elements to command text. User downloads the text file and client apps will show the power point using command.

Instant Message Server

Provide Command Transition. It is responsible for sending command to others in backend system. It will send text message and client need to filter the Tag so that certain function will receive the command.

- *user interface design*

The screenshot shows the LearnAble mobile application interface. At the top, there is a navigation bar with icons for Home, Chat, Record, and Help. Below the navigation bar is a header with the text "LearnAble" and a user profile icon. The main content area contains a video feed of a student wearing glasses, with the text "student1" below it. To the right of the video feed is a whiteboard section with several cards:

- Baseline Metrics:** Topics covered: Data and case of software metrics, Metrics in general, Software metrics, Software quality metrics.
- Topics covered:** Fundamentals of software metrics, Metrics in general, Software metrics, Software quality metrics.
- Fundamental Questions:** How big is the program? Huge!!
- Need for Baseline Metrics:** To determine the quality of the current product or process, To predict the quality of the current product or process, To improve quality of a product/process.
- Usage of Software Metrics:** To determine the quality of the current product or process, To predict the quality of the current product or process, To improve quality of a product/process.
- Scope of Software Metrics:** To determine the quality of the current product or process, To predict the quality of the current product or process, To improve quality of a product/process.

In the bottom right corner of the content area, there is a large heading "Fundamental Questions". Below this heading is a bulleted list of six items:

- How big is the program? Huge!!
- How close are you to finishing? We are almost there!!
- Need information like, cost, effort, size of project.
- Determine the quality of the current product or process
- Predict qualities of a product/process
- Improve quality of a product/process

At the bottom of the screen, there is a toolbar with buttons for "SEND", "One Chat", "Previous", "Page No: 3", "Go", "Next", and a navigation menu icon. The status bar at the very bottom shows the time as 1:32 and various connectivity icons.

Navigation Bar:

User can choose the function needed, it will redraw the main area to show the content.

Main Area:

Show the function selected in the navigation bar like White Board, One Chat, Ask Question, and PowerPoint.

Video Box:

Showing live streaming video in live lesson or playing video on demand in record lesson.

Group Chat Area:

Allow to click user in chat room to start private chat or simply group chat. Toggle Button is to switch between group chat and private chat.

Implementation

- test plan
- changes to design and justification of changes

Test Plan and Result

ID	TC_WB_001
Date	14-2-2012
Performed by	Fung Ka Yiu
Description	Draw rectangle to the whiteboard
Function Testing	Shape Drawing Function
Testing steps	<p>1. Tap "Shape"</p> <p>2. Tap "Rectangle"</p> <p>3. Long press then drag the desired rectangle</p>
Expected Result	Rectangle appears on the teacher's and every students' screen
Actual Result	Rectangle appears on the teacher's and every students' screen
Remarks	

ID	TC_WB_002
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Draw circle to the whiteboard
Function Testing	Shape Drawing Function
Testing steps	<p>1. Tap "Shape"</p> <p>2. Tap "Circle"</p> <p>3. Press then drag the desired circle</p>
Expected Result	Circle appears on the teacher's and every students' screen
Actual Result	Circle appears on the teacher's and every students' screen
Remarks	

ID	TC_WB_003
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Add a straight line to the whiteboard
Function Testing	Drawing Function
Testing steps	<p>1. Tap "Pen"</p> <p>2. Tap "Line"</p> <p>3. Press and drag a straight line</p>
Expected Result	A straight line appears on the teacher's and every students' screen
Actual Result	A straight line appears on the teacher's and every students' screen
Remarks	

ID	TC_WB_004
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Create A path on the whiteboard
Function Testing	Drawing Function
Testing steps	<p>1. Tap "Pen"</p> <p>2. Tap "Path"</p> <p>3. Press and move freely</p>
Expected Result	Arbitrary path appears on teacher and students' screen
Actual Result	Arbitrary path appears on teacher and students' screen
Remarks	

ID	TC_WB_005
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Draw Border rectangle to the whiteboard
Function Testing	Shape Drawing Function
Testing steps	<ol style="list-style-type: none"> 1. Tap "Shape" 2. Tap "Rectangle" 3. Tick "Border" 4. Long press then drag the desired rectangle
Expected Result	Border Rectangle appears on the teacher's and every students' screen
Actual Result	Border Rectangle appears on the teacher's and every students' screen
Remarks	

ID	TC_WB_006
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Draw Border circle to the whiteboard
Function Testing	Shape Drawing Function
Testing steps	<ol style="list-style-type: none"> 1. Tap "Shape" 2. Tap "Circle" 3. Tick "Border" 4. Long press then drag the desired rectangle
Expected Result	Border circle appears on the teacher's and every students' screen
Actual Result	Border circle appears on the teacher's and every students' screen
Remarks	

ID	TC_WB_007
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Draw rectangle to background of the whiteboard
Function Testing	Shape Drawing Function
Testing steps	<ol style="list-style-type: none"> 1. Tap "Shape" 2. Tap "Rectangle" 3. Tick "Background" 4. Long press then drag the desired rectangle
Expected Result	Rectangle appears on the teacher's and every students' screen's background
Actual Result	Rectangle appears on the teacher's and every students' screen's background
Remarks	

ID	TC_WB_008
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Drawing rectangle With Specific Colors on the whiteboard
Function Testing	Styling Function
Testing steps	<ol style="list-style-type: none"> 1. Tap "Shape" 2. Tap "Rectangle" 3. Tap "Setting" 4. Select a specific color and alpha value through scrolling and tapping 5. Tap "OK" 6. Long press then drag the desired rectangle
Expected Result	Rectangle of a specific color appears on the teacher's and every students' screen
Actual Result	Rectangle of a specific color appears on the teacher's and every students' screen
Remarks	

ID	TC_WB_009
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Drawing a straight line With variable thickness on the whiteboard
Function Testing	Styling Function
Testing steps	<ol style="list-style-type: none"> 1. Tap "Pen" 2. Tap "Line" 3. Tap "Setting" 4. Scroll horizontally to vary "stroke" value 5. Press and drag a straight line
Expected Result	A straight line of specific thickness appears on the teacher's and every students' screen
Actual Result	A straight line of specific thickness appears on the teacher's and every students' screen
Remarks	

ID	TC_WB_010
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Shape object moving
Function Testing	Shape object Modification Function
Testing steps	<ol style="list-style-type: none"> 1. Tap "Normal" 2. Tap and Pan a non-background shape (rectangle in test case) on the screen
Expected Result	Rectangle moves on the teacher's and every students' screen's background
Actual Result	Rectangle moves on the teacher's and every students' screen's background
Remarks	

ID	TC_WB_011
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Shape object Resizing
Function Testing	Shape object Modification Function
Testing steps	<ol style="list-style-type: none"> 1. Tap "Normal" 2. Tap a non-background shape (rectangle in test case) on the screen 3. Press and resize the shape
Expected Result	Rectangle changes in size on the teacher's and every students' screen's background
Actual Result	Rectangle changes in size on the teacher's and every students' screen's background
Remarks	

ID	TC_WB_012
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Moving shape forward
Function Testing	Shape object Management Function
Testing steps	<ol style="list-style-type: none"> 1. Tap "Normal" 2. Tap a non-background shape (rectangle in test case) on the screen 3. Tap "^" multiple times
Expected Result	Rectangle in the non-background layer below moves forwards
Actual Result	Rectangle in the non-background layer below moves forwards to the upfront layer gradually until the "^" turns grey and disabled
Remarks	

ID	TC_WB_013
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Moving shape backward
Function Testing	Shape object Management Function
Testing steps	<p>1. Tap “Normal”</p> <p>2. Tap a non-background shape (rectangle in test case) on the screen</p> <p>3. Tap “v” multiple times</p>
Expected Result	Rectangle in the non-background layer moves backwards
Actual Result	Rectangle in the non-background layer moves backwards to the layer right above the background gradually until the “v” turns grey and disabled
Remarks	

ID	TC_WB_014
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Shape movement to the background
Function Testing	Shape object Management Function
Testing steps	<p>1. Tap “Normal”</p> <p>2. Tap a non-background shape (rectangle in test case) on the screen</p> <p>3. Tap “Put to Bg”</p>
Expected Result	Rectangle in the non-background layer moves to the background
Actual Result	Rectangle in the non-background layer move to the background and “^”, “v” and “Put to Bg” turn grey and disabled
Remarks	

ID	TC_WB_015
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Shape movement to the background if the background has shapes
Function Testing	Shape object Management Function
Testing steps	<p>1. Tap "Normal"</p> <p>2. Tap a non-background shape (rectangle in test case) on the screen</p> <p>3. Tap "Put to Bg"</p>
Expected Result	Rectangle in the non-background layer moves to the background and overlaps the background shape pattern
Actual Result	Rectangle in the non-background layer moves to the background and overlaps the background shape pattern
Remarks	

ID	TC_WB_016
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Selecting shape on the background
Function Testing	Background objects
Testing steps	<p>1. Tap "Normal"</p> <p>2. Tap a background shape (rectangle in test case) on the screen</p>
Expected Result	Nothing happens
Actual Result	Nothing happens unless other non-background shape is selected
Remarks	

ID	TC_WB_017
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Erase the background drawing
Function Testing	Erasing Function
Testing steps	<ol style="list-style-type: none"> 1. Tap "Eraser" 2. Move around the whiteboard
Expected Result	Background drawing is being erased
Actual Result	Background drawing was being erased while background templates and non-background drawing were unaffected
Remarks	

ID	TC_WB_018
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Erase the non-background drawing
Function Testing	Erasing Function
Testing steps	<ol style="list-style-type: none"> 1. Tap "Eraser" 2. Move around the whiteboard
Expected Result	Non-background drawing remains unaffected
Actual Result	Non-background drawing were unaffected while background drawing was being erased
Remarks	

ID	TC_WB_019
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Erase the background drawing with different strokes
Function Testing	Erasing Function
Testing steps	<p>1. Tap “Eraser”</p> <p>2. Scroll the bar below</p> <p>3. Move around the whiteboard</p>
Expected Result	Background drawing is being erased with a different strokes
Actual Result	Background drawing was being erased with a different strokes
Remarks	

ID	TC_WB_020
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Undo previous drawing
Function Testing	Undo and Redo Events
Testing steps	<p>1. Tap “Pen”</p> <p>2. Tap “line”</p> <p>3. Press and drag a line</p> <p>4. Tap “Undo”</p>
Expected Result	A line appears and disappears
Actual Result	A line appeared and disappeared
Remarks	

ID	TC_WB_021
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Undo Styling Function
Function Testing	Undo and Redo Events
Testing steps	<p>1. Tap "Pen"</p> <p>2. Tap "Setting"</p> <p>3. Pick a color and Scroll to vary stroke</p> <p>4. Tap "Undo"</p> <p>5. Tap "Pen"</p> <p>6. Tap "line"</p> <p>7. Press and drag a line</p>
Expected Result	A line appears according to the styling in step 3
Actual Result	Undo bottom was not available for use and a line was drawn according to style set in step 3
Remarks	

ID	TC_WB_022
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Undo resizing
Function Testing	Undo and Redo Events
Testing steps	<p>1. Tap "Shape"</p> <p>2. Tap "Circle"</p> <p>3. Press and drag a circle</p> <p>4. Tap "Normal"</p> <p>5. Tap the circle</p> <p>6. Tap and resize the circle (enlarge the circle in test case)</p> <p>7. Tap "Undo"</p>
Expected Result	A circle appears on the screen, grows bigger and turns to original size
Actual Result	A circle was placed on the screen, enlarged and turned back to the original size after "undo" was tapped
Remarks	

ID	TC_WB_023
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Undo more than one time
Function Testing	
Testing steps	<p>1. Tap "Shape"</p> <p>2. Tap "Circle"</p> <p>3. Press and drag a circle</p> <p>4. Tap "Normal"</p> <p>5. Tap the circle</p> <p>6. Tap and resize the circle (enlarge the circle in test case)</p> <p>7. Tap "Undo"</p> <p>8. Tap "Undo"</p>
Expected Result	A circle appears on the screen, grows bigger. Then, the circle turns back to original size and disappears
Actual Result	A circle was placed on the screen, enlarged and turned back to the original size after tapping "Undo" once. It was disappeared after second tapping "Undo"
Remarks	

ID	TC_WB_024
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Undo Movements
Function Testing	Undo and Redo Events
Testing steps	<ol style="list-style-type: none"> 1. Tap "Shape" 2. Tap "Circle" 3. Press and drag a circle 4. Tap "Normal" 5. Tap the circle 6. Tap and Pan the circle on the screen 7. Tap "Put to Bg" 8. Tap "Undo" 9. Tap "Undo"
Expected Result	A circle appears on the screen and moves around and returns to the original location. Then, it disappears
Actual Result	A circle was placed on the screen and moved around. Then, it appeared at the original location and disappeared
Remarks	

ID	TC_WB_025
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Redo An Undo
Function Testing	Undo and Redo Events
Testing steps	<ol style="list-style-type: none"> 1. Tap "Pen" 2. Tap "line" 3. Press and drag a line 4. Tap "Undo" 5. Tap "Redo"
Expected Result	A line appears, disappears and then appears
Actual Result	A line appears, disappears and then appears
Remarks	

ID	TC_VIDEO_001
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Load Video when start a live lesson
Function Testing	Video Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Lesson Page loaded 3. Video Loaded
Expected Result	Video Loaded
Actual Result	Video Loaded
Remarks	

ID	TC_VIDEO_002
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Load Video when start a record lesson
Function Testing	Video Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Lesson Page loaded 3. Video Loaded
Expected Result	Video Loaded
Actual Result	Video Loaded
Remarks	

ID	TC_VIDEO_003
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Correct lesson video loaded when start at a live lesson
Function Testing	Video Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Click Lesson "SE Lesson 1" 3. Video Loaded
Expected Result	Video "SE Lesson 1" Loaded
Actual Result	Video "SE Lesson 1" Loaded
Remarks	

ID	TC_VIDEO_004
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Correct lesson video loaded when start at a record lesson
Function Testing	Video Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Click Lesson "SE Lesson 1" 3. Video Loaded
Expected Result	Video "SE Lesson 1" Loaded
Actual Result	Video "SE Lesson 1" Loaded
Remarks	

ID	TC_VIDEO_005
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Correct upstreaming video to server by Adobe Flash Encoder
Function Testing	Video Upstream Function
Testing steps	<ol style="list-style-type: none"> 1. Get the lesson number 2. Enter information in Flash Encoder 3. Click "DVR auto record" 4. Click "Start" 5. Student select lesson 6. Lesson Page Started 7. Video Played
Expected Result	Video "SE Lesson 1" Loaded
Actual Result	Video "SE Lesson 1" Loaded
Remarks	

ID	TC_VOICE_001
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Connect to Telephone Server when Lesson page started
Function Testing	Voice Chat Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Lesson Page loaded 3. Register to telephone server in background
Expected Result	Server show the session
Actual Result	Server show the session
Remarks	

ID	TC_VOICE_002
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Call SomeOne
Function Testing	Voice Chat Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Lesson Page loaded 3. Register to telephone server in background 4. Click people name to start private Chat 5. Call the selected people 6. Receive 7. Click Button to talk
Expected Result	Can chat
Actual Result	Can chat
Remarks	

ID	TC_VOICE_003
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Receive SomeOne Call
Function Testing	Voice Chat Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Lesson Page loaded 3. Register to telephone server in background 4. Receive Some one call 5. Click Button to talk
Expected Result	Can chat
Actual Result	Can chat
Remarks	

ID	TC_VOICE_004
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Call Correct Person
Function Testing	Voice Chat Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Lesson Page loaded 3. Register to telephone server in background 4. Click people name to start private Chat 5. Call the selected people = "student1" 6. "student1"Receive 7. Click Button to talk
Expected Result	Status show talking with "student11"
Actual Result	Status show talking with "student11"
Remarks	

ID	TC_VOICE_005
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Receive Correct Person
Function Testing	Voice Chat Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Lesson Page loaded 3. Register to telephone server in background 4. Receive "Student1" call 5. Click Button to talk 6. "student1"Receive 7. Click Button to talk
Expected Result	Status show talking with "student11"
Actual Result	Status show talking with "student11"
Remarks	

ID	TC_CHAT_001
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Session Register in IM Server when program start
Function Testing	IM Function
Testing steps	<ol style="list-style-type: none"> 1. Enter Correct username and password and login 2. Login to IM Server in background
Expected Result	Server show session
Actual Result	Server show session
Remarks	

ID	TC_CHAT_002
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Session cannot Register in IM Server when program start with wrong password
Function Testing	IM Function
Testing steps	<ol style="list-style-type: none"> 1. Enter wrong username and password and login 2. Login to IM Server in background
Expected Result	Server don't have required session
Actual Result	Server don't have required session
Remarks	

ID	TC_CHAT_003
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Teacher create a chat room when lesson start.
Function Testing	IM Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Click Lesson 3. Chat Room Loaded
Expected Result	Server show chat room information
Actual Result	Server show chat room information
Remarks	

ID	TC_CHAT_004
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Start a private Chat
Function Testing	IM Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Click Lesson 3. Chat Room Created 4. Select a name in the name list 5. One Chat page will show 6. Talk to the one that selected
Expected Result	Message sent ad another people receive
Actual Result	Message sent ad another people receive
Remarks	

ID	TC_CHAT_004
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Start a private Chat
Function Testing	IM Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Click Lesson 3. Chat Room Created 4. Select a name in the name list 5. One Chat page will show 6. Talk to the one that selected
Expected Result	Message sent ad anther people receive
Actual Result	Message sent ad anther people receive
Remarks	

ID	TC_CHAT_005
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Show a correct list in the chat room list
Function Testing	IM Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Click Lesson 3. Chat Room Created 4. Select a name in the name list 5. One Chat page will show 6. Another people "Student2" login and do the same step in previous mentioned.
Expected Result	"Student2" show in the list
Actual Result	"Student2" show in the list
Remarks	

ID	TC_CHAT_006
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Show a correct list in the chat room list
Function Testing	IM Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Click Lesson 3. Chat Room Created 4. Select a name in the name list 5. One Chat page will show 6. Another people "Student2" login and do the same step in previous mentioned but in another lesson.
Expected Result	"Student2" not show in the list
Actual Result	"Student2" not show in the list
Remarks	

ID	TC_CHAT_007
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Fail to start a private chat if the user is not in the chat room
Function Testing	IM Function
Testing steps	<ol style="list-style-type: none"> 1. Select the lesson 2. Click Lesson 3. Chat Room Created 4. Select a name in the name list 5. One Chat page will show 6. Another people "Student2" login and do the same step in previous mentioned but in another lesson.
Expected Result	List not show and cannot start private chat
Actual Result	List not show and cannot start private chat
Remarks	

ID	TC_SYS_001
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Successful login if correct id and password
Function Testing	Login Function
Testing steps	1. Enter correct id and password
Expected Result	Login Successful
Actual Result	Login Successful
Remarks	

ID	TC_SYS_002
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Fail login if correct id and password
Function Testing	Login Function
Testing steps	1. Enter correct id and password
Expected Result	Login Fail
Actual Result	Login Fail
Remarks	

ID	TC_SYS_003
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Teacher show navigation bar with item "Start Lesson and Logout"
Function Testing	Navigation Bar Function
Testing steps	1. Enter correct id and password with Teacher Account
Expected Result	navigation bar with item "Start Lesson and Logout"
Actual Result	navigation bar with item "Start Lesson and Logout"
Remarks	

ID	TC_SYS_004
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Student cannot show navigation bar with item "Start Lesson and Logout"
Function Testing	Navigation Bar Function
Testing steps	1. Enter correct id and password with Student Account
Expected Result	navigation bar with item "Attend Lesson and Logout"
Actual Result	navigation bar with item "Attend Lesson and Logout"
Remarks	

ID	TC_SYS_005
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Student show navigation bar with item "Attend Lesson and Logout"
Function Testing	Navigation Bar Function
Testing steps	1. Enter correct id and password with Student Account
Expected Result	navigation bar with item "Attend Lesson and Logout"
Actual Result	navigation bar with item "Attend Lesson and Logout"
Remarks	

ID	TC_SYS_006
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Student cannot show navigation bar with item "Attend Lesson and Logout"
Function Testing	Navigation Bar Function
Testing steps	1. Enter correct id and password with Teacher Account
Expected Result	navigation bar with item "Start Lesson and Logout"
Actual Result	navigation bar with item "Start Lesson and Logout"
Remarks	

ID	TC_SYS_007
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Student show lesson list
Function Testing	Lesson List Function
Testing steps	<ol style="list-style-type: none"> 1. Enter correct id and password with Student Account 2. Click Attend Lesson
Expected Result	List will be show
Actual Result	List will be show
Remarks	

ID	TC_SYS_008
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Student show lesson list with the module subscribe
Function Testing	Lesson List Function
Testing steps	<ol style="list-style-type: none"> 1. Enter correct id and password with Student Account "student2" 2. Click Attend Lesson
Expected Result	List will be show with "Software Engineering SE Lesson 2"
Actual Result	List will be show with "Software Engineering SE Lesson 2"
Remarks	

ID	TC_SYS_009
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	Student click the category and it will show the corresponding lesson
Function Testing	Lesson List Function
Testing steps	<ol style="list-style-type: none"> 1. Enter correct id and password with Student Account "student2" 2. Click Attend Lesson 3. Click "Software Engineering" in the left
Expected Result	List will be show with "Software Engineering SE Lesson 2"
Actual Result	List will be show with "Software Engineering SE Lesson 2"
Remarks	

ID	TC_SYS_010
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	It will show the lesson when click the list
Function Testing	Lesson List Function
Testing steps	<ol style="list-style-type: none"> 1. Enter correct id and password with Student Account "student2" 2. Click Attend Lesson 3. Click "Software Engineering" in the left 4. Click "SE Lesson 2"
Expected Result	"Software Engineering SE Lesson 2" will show
Actual Result	"Software Engineering SE Lesson 2" will show
Remarks	

ID	TC_SYS_011
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	It will not show the lesson when click the list that is not available
Function Testing	Lesson List Function
Testing steps	<ol style="list-style-type: none"> 1. Enter correct id and password with Student Account "student2" 2. Click Attend Lesson 3. Click "Software Engineering" in the left 4. Click "Lesson is not available"
Expected Result	Nothing will show
Actual Result	Nothing will show
Remarks	

ID	TC_SYS_012
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	It will show the lesson when lesson number is entered
Function Testing	Start Lesson Function
Testing steps	<ol style="list-style-type: none"> 1. Enter correct id and password with Teacher Account "teacher2" 2. Click Start Lesson 3. Enter "2" in the lesson 4. Lesson Started
Expected Result	Nothing will show
Actual Result	Nothing will show
Remarks	

ID	TC_SYS_012
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	It will not show the lesson when lesson number is entered and is created before
Function Testing	Start Lesson Function
Testing steps	<ol style="list-style-type: none"> 1. Enter correct id and password with Teacher Account "teacher2" 2. Click Start Lesson 3. Enter "4" in the lesson 4. Lesson not Started
Expected Result	Nothing will show
Actual Result	Nothing will show
Remarks	

ID	TC_QuestionBank_001
Date	12-5-2012
Performed by	Tai Ching Kiu
Description	It will show when lesson on
Function Testing	Question Bank Function
Testing steps	<ol style="list-style-type: none"> 1. Enter correct id and password with student 2. Click Start Lesson 3. Enter Lesson 4. Lesson Started 5. Question bank loaded 6. Click "Question Bank" in the notification bar
Expected Result	Question Bank show
Actual Result	Question Bank show
Remarks	

ID	TC_WB_026
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Redo more than one time
Function Testing	Undo and Redo Events
Testing steps	<p>1. Tap "Shape"</p> <p>2. Tap "Circle"</p> <p>3. Press and drag a circle</p> <p>4. Tap "Normal"</p> <p>5. Tap the circle</p> <p>6. Tap and resize the circle (enlarge the circle in test case)</p> <p>7. Tap "Undo"</p> <p>8. Tap "Undo"</p> <p>9. Tap "Redo"</p> <p>10. Tap "Redo"</p>
Expected Result	A circle appears on the screen, grows bigger. Then, the circle turns back to original size and disappears. After that, the circle re-appears on the screen, grows bigger to that size again
Actual Result	A circle appears on the screen, grows bigger. Then, the circle turns back to original size and disappears. After that, the circle re-appears on the screen, grows bigger to that size again
Remarks	

ID	TC_WB_027
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Undo a Redo
Function Testing	Undo and Redo Events
Testing steps	<ol style="list-style-type: none"> 1. Tap "Pen" 2. Tap "line" 3. Press and drag a line 4. Tap "Undo" 5. Tap "Redo" 6. Tap "Undo"
Expected Result	A line appears and disappears. Then it again appears and disappears
Actual Result	A line appears and disappears. Then it again appears and disappears
Remarks	

ID	TC_WB_028
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Simple Redo Model
Function Testing	Undo and Redo Events
Testing steps	<p>1. Tap "Shape"</p> <p>2. Tap "Circle"</p> <p>3. Press and drag a circle (a large)</p> <p>4. Press and drag another circle (a small)</p> <p>5. Tap "Undo"</p> <p>6. Tap "Shape"</p> <p>7. Tap "Rectangle"</p> <p>8. Press and drag a rectangle</p> <p>9. Tap "Undo"</p> <p>10. Tap "Undo"</p> <p>11. Tap "Redo"</p> <p>12. Tap "Redo"</p>
Expected Result	Two circles appear in succession. The latter one disappears and a new rectangle appears. Next, rectangle disappears and circle disappears. Then, a circle (larger one) appears and rectangle come next.
Actual Result	Two circles appear in succession. The latter one disappears and a new rectangle appears. Next, rectangle disappears and circle disappears. Then, a circle (small one) appears and rectangle come next.
Remarks	Making a new edit usually clears the redo list

ID	TC_WB_029
Date	12-5-2012
Performed by	Fung Ka Yiu
Description	Students touch screen
Function Testing	View Function
Testing steps	1. Student touches screen
Expected Result	Nothing happens.
Actual Result	No observable change in teacher's and students' screen
Remarks	

Changes to design and justification of changes

In the implementation stage of the system development, there are several problems encountered and force us to change the system design. And the design changes and the reason below:

Cancellation of video conference

Video conference is a function which involves much different process like encoding from video feed, streaming and packet transfer through internet and decoding into video display in the tablets computer.

Which need many different kinds of technology to implement, and there are not much open source library available and able to be used in Android device. Also bandwidth needed for video conference and live lesson video streaming at the same time is huge. Also because of the time constraints, the video conference is canceled.

Voice Chat Added

To substitute the canceled video conference, the voice chat function is added, after the user select one of the user in same lesson in messaging column and click the voice chat button to send voice stream the recipient and let user can chat other than text message. This will convenience for users to communicate with other users and don't need to type.

XMPP Instant Messaging added

In the previous plan, there is no any plan about instant messaging. But the XMPP back-end already achieves use application of XMPP probably. We just need to display message in the tablets computer is enough. So the students in a same lesson able to the text messaging each other may be discuss about the content of the lesson without eyes leave the live lesson streaming. There will be no any situation like trying to teach other student will miss some point any hard to catch.

No Animation on PowerPoint Synchronization

Because there are not enough open-source libraries support displaying PowerPoint in an Android device. So we are not able to display every element in PowerPoint file in the tablet computer. And due to the time constraints, we gave up developing that function and only static PowerPoint page display in PowerPoint Synchronization and no any animation and page transit effect in displaying PowerPoint file.

Results and conclusions

- Summary and a critical discussion of the results, conclusions
- Problems/difficulties encountered
- Delays/changes in project schedule
- Limitations of the proposed system
- Subsection suggesting further developments to be undertaken.

- *Summary and a critical discussion of the results, conclusions*

After implement the project of develop the online tutoring system. There are lots of things that we have learnt from the period of project. And here is the summary after the project is finally finished.

To build a system that need so many different functions, it is no way for us to start from a scratch and developing all by ourselves because it will take so many time and the skill we have is not enough. So the procedure of project implementation is stated and explained below.

First of all, we have to think about how we going to achieve the function we need. Especially the live lesson video streaming and PowerPoint synchronous needs many procedure in order to achieve the whole function. Like the live lesson video streaming need to first capture video from a camera, then encode, send it using protocol like RTSP make it able to stream and deal with packet lost, and receive the packet, decode to be a playable video and display in the recipient tablet computer. Thinking of the whole procedure make we can find the right technology to implement the function in proposed system.

Secondly, we found the possible protocols, library which might able to implement and finish the function that we plan to complete. Like the instant messaging use XMPP and perform by Asmack which is library which can use XMPP in an Android environment and able to be used in PCs, IOS devices and android device, which enable cross-platform text messaging. Is a advantages for the whole system can be used in different environment and able to communicate to each other.

After that, we will test how to implement the different function will be used in the system as testing. Like we develop a little White Board for testing the white board drawing function like draw a line, some shapes and etc.. An advantage of this approach is that we can discover the possibility of the technology will achieve the function required and able to change if it is not possible.

If every part is done testing, the last step is to combine all the technology used and become one single system for android tablet computer in this case. Also the User Interface will define at this point and the program flow is all set and hopes for the best user experience that would achieve.

Finding open source library to help finishing this system is very important in the development process. Because the skill and knowledge for us is not enough and time as well, so we need many library to call and use their resource to implement the project.

Problems/difficulties encountered

In the progress of the proposed system development, there are problems we've encountered. Here's the problem depends on different function of the system.

Video Conference

The problem encounter when developing this function is there are less technology to uploading video available in the android platform. Also the synchronous between sound and the video is quite hard to dealt with. Also the video streaming needed a large bandwidth, low bandwidth can lead to frame dropping and correction of time during playing. So due to the time constraints as well as the two reasons stated above, this function is canceled in the end. We develop voice chat instead.

White Board

Because the white board is available for a whole class in the same lesson able to draw in the board. So maybe there will be more than one participant draw on the board at the same time. The command which send to other device the update the board need a good control of time to prevent the board look different because of the bandwidth is different.

PowerPoint Presentation

Our previous proposed solution of Power point is to read the .ppt file to the command which can solve by our program. And the tools available might not exist and need to develop our standard that can be used in different platform of other group working in the different platform. Also after the client device (android tablet) received the command. It is hard to be display it in the device because there are many component can appear in PowerPoint file like table, motion text or shapes. And the solution right now is to capture static picture of every page of PowerPoint file after teacher uploaded PowerPoint file to server which hold the lesson and capture to a set of picture and synchronous to every student in the lesson. But the animation will not able to show.

Asking Question

The problem of asking question is to keep consistency of different amount of like given to question asked during the lesson. Because of network problem, the commands of uploading new question or give like to the question need time to sync with all participants' device.

Live Lesson Streaming

Because the limitation of network environment and the processing power of tablet computer is limited. The quality of live lesson may not very high and able to see every detail of lesson very clearly. And the audio and video is hard sync.

- *Delays/changes in project schedule*

In the previous project schedule, all the function need to finish testing and able to be combined at the end of February to begin of March. However, there are many problem or difficulties encounter in the implement stage and already discuss before. And some of them cannot be fixing and need to modification in the end. About the changes is made about project schedule will be stated below in detail.

About the video conference, the member in charge has tried many ways to implement the video conference appropriate and useable in an Android 3.2 tablet computer. However, the solution is not been figured out until the end of April. So due to the time constraints and there will be later stage need to keep going, the video conference is cancel and the time of video conference stall to the end of April.

Also because the White Board Function, there are many sub-function like drawing different shaped and the change of technology for implementation makes the development time in longer than the plan stated in the plan. So the development time of White Board is longer and the finish time is the middle of April.

Due to the technical problem stated before in the problem or difficulties part of these documents, the PowerPoint synchronous function is stall until the end of April to looking for if there is any open source library to use for Android device. However it is fail to be done and the develop time stall till the end of April. Also the PowerPoint is not support animation and page transit effect just supports static PowerPoint elements only.

Due to the reason mentioned before, the project time is stall few months away and the system integration as well as the final user interface implementation start at begin of May. And the function finalize in the second week of May.

- *Limitations of the proposed system*

As the problem has been stated before, some of the problem maybe doesn't have solutions to deal with. Therefore we may need to find some alternatives so that we can still provide the functions in some ways. But we can promise anything in this stage.

Live Lesson Video Streaming

In the specification of Android, RTMP invented by Adobe is not supported by Android. Streaming Protocol only support RTSP. Therefore it occurs two problems: one is upstream, that is the stream of video upload to the streaming server, and one is downstream, that is the stream of video download to the streaming server. In early stage, we have found the solution to fix the problem of downstream. We now propose to use Wowza Streaming Server as our streaming server since it supports RTMP and RTSP natively and live converter so that it can provide video stream to variety operating mobile platform, for example, IOS and Android.

However, the problem of upstream still cannot be fixed. Since RTSP protocol implemented in Android mainly support downloading the video, if natively we do up streaming, the only way we can do is using socket. However we found that using socket is quite not efficient. First, some of the device we only show some green color in the video that we received in the server. Second, using socket is quite limited. The number of client we be limited depends on how many ports provided in the Server. Also we need to write a program to distribute the port number to the client. Therefore we propose not to use socket.

Then, we found another way to do it. Using motion jpeg to stream video and using open source software to send the audio. Since we do it in a separate way without timestamp. Therefore the drop flames of video is quite serious and video and sound are not synchronize. We hope we can fix it in later stage.

Bandwidth is also a problem. For example, if using in a slow internet network, the performances of applications must be much poorer than in quick internet network. We try to decrease the quality and size of the video and hope it can deal with it. So the video conference which need to upstream from android device is canceled because there are no any appropriate solution to complete the function. Only the function just using downstream which is live less video streaming is on.

White Board

The white board is sync all devices by the internet, the bandwidth will affect if the board looks the same at the same. There will be delay after new line has drawn. Also because the line is record as a command and sent to every user use the white board. So the line might look slightly different to each other.

Synchronization of student and teacher is quite hard. Since there are many situations that occur, for example, Instant Message may send lost the command. Then command may not be complete. Also if student and teacher draw something at same time, one of the drawings may not be shown due to the command receive.

Different Android device has different resolution of monitor. Our system is using coordinate to locate the drawing, different monitor may return different location, and therefore some of the drawing may wrong size or out frame.

PowerPoint Presentation

In previous proposed solution, Teacher need to upload the file to our server to transcode to command. Our system can only read the command line text file. But in now stage, the transcoded command may not be complete. Therefore the power point displayed in the device may not be completed also.

Animation Synchronization is also a big challenge for us. We still cannot find any way to do it because the animation invented by Microsoft Office may not apply in Android and quite complex. It will burden the android system.

The external library using in the function is open source but extremely complex. It is not easy to read it. We can just try to using the example provided in the internet and we cannot make changes in the library that we need.

Due to the time constraints, the function is cut to only static PowerPoint will be show like a picture and animation and page transit effect is not support at the moment.

Asking Question

Now we propose to put “Ask Question” to web server. Using PHP, MYSQL and JQuery Mobile Framework. The speed of development is much faster than before. We have invented the similar skeleton of other system; we just need to write the code in backend to make the system works. However the limitation of other system makes us to busy on fixing the problem, the development is now slow down. We hope we can catch up later on.

Subsection suggesting further developments to be undertaken.

Even the online tutoring system is finished. But there are lots of ways to further develop and made a better system for android tablet.

Video conference

Even the video conference is canceled because of the development time constraints, the huge bandwidth needed. However, this environment problem will change because the network would be upgraded and the time will be not a problem. This function can let user able to see each other faces and have better communication since face emotion is viewable at this point.

Enhance video quality of live lesson

Due to the reason of bandwidth as well as the process time of video encoding or decoding, also the reason the bandwidth of supported, the video quality is not so well. But in the future, the resolution of video would rise up to 720p. And the user able to choose different resolution according their needs.

Improve the smoothness of whiteboard

Because there will be lots of CPU resource taken for white board function, drawing in the white board is not smooth enough to look like actual curve line. We will figure ways reduce resources taken by white board function to free more space for reading user input and have better drawing tools for users. Also the process power of the tablet computer in the future will be improved, that is a time to actually improve smoothness and give better experience to users.

Add Screen Capture from Teacher Function

Sometime the teachers want to show something that might not part of the PowerPoint or drawing to student. To give more flexibly to teachers and let them able to show more kinds of thing like applications in the computer. The function will capture screen of teachers' computer and stream to students' tablet computer, the student and watch the screen of teachers' computer with the commentary of teachers. They will learn more by that kind of approach.

Full display in PowerPoint Synchronization

Like we mention in the requirement and the changes to design, the PowerPoint is not able to display any animation and page transit in the PowerPoint Synchronization function. It is because there no any appropriate library can be used in Android system. But if there are any libraries in the future, the PowerPoint Synchronization will be upgraded and able to show PowerPoint animation and page transit.

Reference

- Contain links that we have reference before.

References

Video Conference + Lesson Video Streaming

<http://www.wowza.com/>

<http://www.adobe.com/products/flashmediaserver/flashmediaencoder/>

<http://code.google.com/p/camandroiduni/>

<http://ffmpeg.org/>

White Board

<http://www.helloandroid.com/tutorials/how-use-canvas-your-android-apps-part-1>

<http://www.helloandroid.com/tutorials/how-use-canvas-your-android-apps-part-2>

<http://stackoverflow.com/questions/3467334/erase-bitmap-parts-using-porterduff-mode>

PowerPoint

<http://poi.apache.org/>

Instant Messaging

<http://www.beem-project.com/>

<http://www.xmpp.org/>

<http://www.igniterealtime.org/projects/openfire/>

<http://code.google.com/p/asmack/>