Software Engineering Project Report

Report for Distributed Collaboration Support - PassMe

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I Project Description

1 Project Overview

Online learning can be as good or even better than in-person classroom learning and we hope to achieve that through PassMe. The aim of passme is to create a classroom like experience for the students and teachers. Passme creates a virtual lecture hall setting where students can represent themselves and their reactions through avatars and also be able to switch seats in the virtual classroom(through push notifications). PassMe also creates a virtual "baton" mechanism through which presenters can pass around batons for elbow-partner interactions, these batons will be handy in most of the situations where some object needs to be passed around.(Like the penguin in CS 261)

2 The Purpose of the Project

Lack of communication skill development in online students has become a rising problem in the past few months and our portal is just the right tool to bridge the gap between remote learning and in-person learning. We came up with the name PassMe as it resonates with passing the "Baton" from in-person leaning to remote instruction.

What students need is a way to study online which is not only effective but also fun and most importantly interactive.. This will be made possible with our software which provides a series of features and tools which makes online learning an experience worth having.

our software will enable the teacher and the student to set their own learning environment, with added flexibility of setting a workplace which is much more similar to the in-person type of classrooms.

The possibilities with this innovation are endless, from choosing whom you want to be seated next to in our virtual classroom to using customizable avatars to provide real time expressions during lectures to increase interactiveness.

2a The User Business or Background of the Project Effort

PassMe will be developed as a plug-in for BlackBoard Collaborate through which we hope to build a powerful tool to aid online learning. Later on PassMe can be used by most of the colleges around the world as a plug-in to their online teaching portals. Online learning has become a necessity after the COVID-19 outbreak and PassMe is here to give online learning a new/improved look altogether.

Many colleges have opted to teach through online synchronous lectures because of which many students feel left out and even helpless hence there is a huge need for a product like PassMe.

PassMe is not just a tool to aid online learning but it helps the user to become a well rounded student, which is one of the most important aspects of being a student at an university, which was not possible with online lectures until PassMe came along.

2b Goals of the Project

PassMe is built to make online learning more accessible, more interesting and more interactive. Online learning shouldn't be just like in-person learning, only better.

We hope to build a product that makes a student enjoy the interactive environment of a classroom from the safety and comfort of their homes even if they live on another side of the world.

We want to be able to make PassMe available as a downloadable plug-in/software which can be integrated easily to any university/college's portal or online teaching platform.

2c Measurement

Once the product is developed the first tier of measurement would be the number of downloads of the product by educational institutions in the beginning months of the product launch. The second tier of measurement would be to send a feedback form to those institutions and see how the teachers and students responded to the product. Once the product has gained some credibility in the teaching industry the final tier would be to monitor the increase in downloads of the product on a monthly basis.

3   The Scope of the Work

Production and delivery of online classroom lectures in a more vibrant setting which is more beneficial and interactive. It has ample aspects which makes it somewhat better than existing projects which suffice such needs.

3a The Current Situation

Currently, the client has access to usual online collaboration tools during this pandemic which don't have a productive mode of sharing expressions during communications lacking a camera. The client feels left out attending meetings through these portals as there's no one immediately seated next to them and they don't get a sense of being seated right next to someone else.

3b The Context of the Work
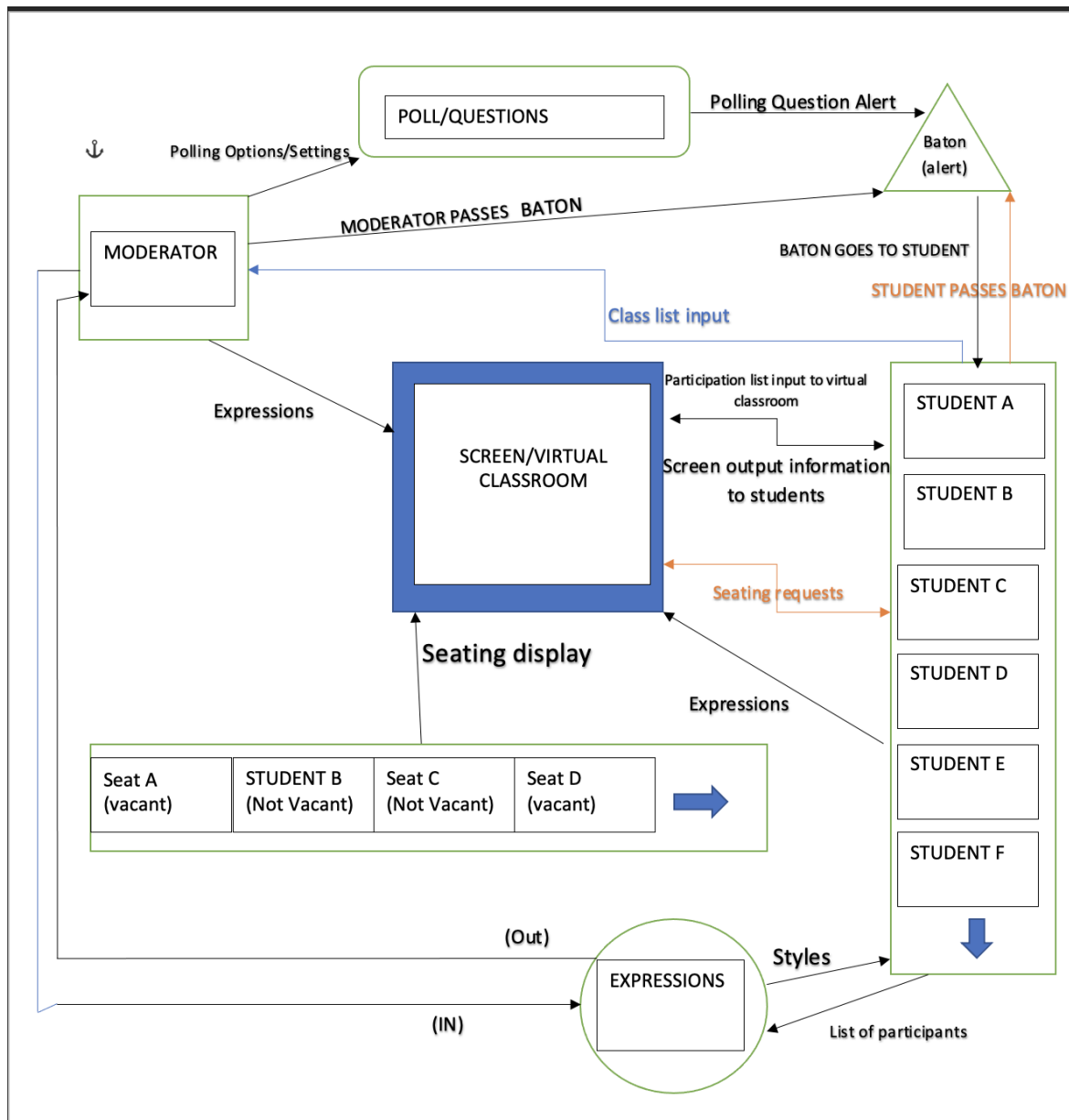
Figure 1 - Context of the Work for PassMe

3c Work Partitioning

Business Event List

Event Name	Input and Output	Summary
1. Creating virtual	Participant list(in)	Record the attendee count

seats/lecture hall setting display	seating display(out)	and create virtual seats(positions)
2. Moderator drops in-class question/poll	Participant list (in) Answer Turn Alert (out) Passing Baton(out)	Bring in the list of all participants and choose a random attendee for an answer. Record the attendee details.
3. Attendee switching position	Participant seating order(in) vacant positions list(in) Seat Request Alert(out)	Display list of taken and vacant seat positions for the attendee and transfer as per choice.
4. Attendee receiving a baton	Receive alert(in) choice(out)	Notify about received baton, request and record response.
5. Attendee passing a baton	Pass options(in) Pass alert(out)	Display pass options (random/in-order) and pass as chosen.
6. Participants exhibit expression	Expression styles(in) Participant list(in) Chosen Expression(out)	Display expression options, request recipients for chosen expression.

3d Competing Products

Clients currently might have access to the online collaboration platforms like "Zoom", "BlackBoard Collaborate", "Google Meet", "Microsoft Teams", "Skype" or "Cisco Webex" which suffice standard video conferencing requirements for multiple clients at a time. Their aim is to provide a sense of connectivity as equivalent to in-person meetings but remotely, which is similar to our goals but our product takes a step ahead in enabling the client to be able to perform more expressibility even while a video support is not available.

4 The Scope of the Product

The proposed product makes online collaboration and delivery of online classroom lectures more interactive for it's clients. Once someone is connected to their preferred platform using PassMe they'll be able to view much more options than the standard chat or emoticon options and the standard attendee panel. They'll have a more dynamic view of a virtual representation of attendees seated in a classroom/lecture hall and would be able to show expressions using their avatars. They would also be able to receive and pass virtual batons.

4a Scenario Diagram(s)
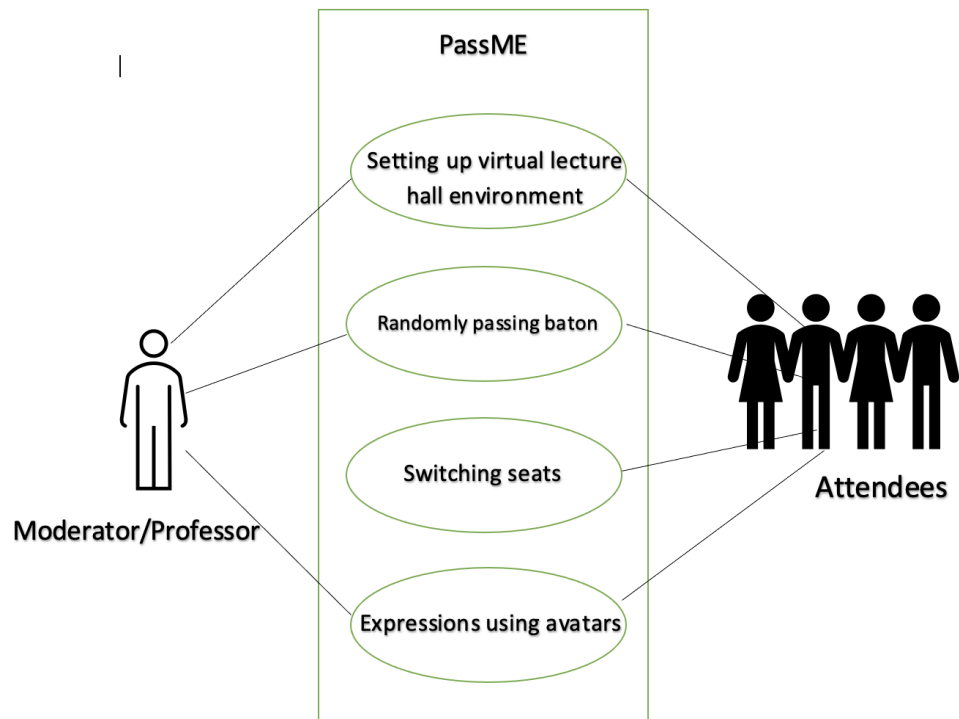
Figure 2- Scenario Diagram for PassMe

4b Product Scenario List

Scenarios	Actors	Purpose of using PassMe
Scenario A	John Doe	Giving random students a chance to answer question during online class (passing baton randomly)
Scenario B	Richard Miles	Being able to be seated next to someone during online class
Scenario C	Mary Major	To be able to play a party game like Passing the Parcel with friends virtually.

4c Individual Product Scenarios

Scenario A: John Doe is a clinical professor at the University of Technology who finds it difficult to increase the number of random students participating during his online synchronous lectures, it's mostly common students who are the only ones to respond to his in-class questions everytime, rest class participation is just negligible. Using PassMe can help them as it would throw a virtual baton to a random student for the Professor and then the student would need to answer the question.

Scenario B: Richard Miles is a computer science student at the University of Higher Education who feels left out while attending online lectures, during in-person lectures, they would talk to their elbow-partners for any class related concerns which is not possible that much in online platforms. Using PassMe would be beneficial as it would display a virtual lecture hall setting to all attendees of the meeting and they would have a sense of being seated next to each other.

Scenario C: Mary Major is a teen who used to like attending house parties but the pandemic has made it difficult for them. Now they do celebrate with friends using video conferencing but it's not much fun as it lacks fun games. They would usually play a game of Passing the Parcel with their friends which unfortunately can't be played using a physical object due to constraints of the current pandemic. Pass me would be quite a helpful tool for them because they can create a virtual room, choose to sit next to each other and pass virtual batons among themselves and enjoy the game.

5 Stakeholders

5a The Client

The client is the CEO of the company called TechNovate. He has been keen on getting his company to provide apps that will directly benefit his company. Moreover, he hoped that this app will potentially be a sort of advertisement for his company thus increasing the amount of revenue that he will rake in. The client sees this software as the next innovation in the virtual world, transforming how professional/ educational sessions are held and thus changing the world of online communication forever.

5b The Customer

The customers are private and public educational institutions. These institutions would use the software to improve the participation of students in online classes, keeping them active during classes, thus in turn helping them to gain knowledge. The customers can also be commercial institutions who would like to host meetings in a customized virtual environment.

5c Hands-On Users of the Product

The application may be used by teachers with varying technical expertise, students of all age groups and backgrounds. The application can also be used by industry professionals looking to host or attend a meeting, by a group of people looking to connect in an interactive virtual environment, by event goers and organizers, or anyone looking to connect with other people.

5d Maintenance Users and Service Technicians

The developers will maintain the app in order to fix bugs or make improvements in general. As for software updates, the programmers will make new changes to the existing app, but it will be up to the users to apply the changes. The clients could also ask the software engineers to make changes to maintain or update the app. The updates to new features will of course be implemented by the design team for this product. The user will have to access the app using the website. Even without the latest updates, the app will still work and ensure the user has a great time using the app.

5e Other Stakeholders

First and foremost, the application "PassMe" would be a support application hence, input from existing video conferencing collaboration platforms would be needed, for example BlackBoard Collaborate. Stakeholders would not necessarily be negatively impacted because the goals of this project since initiation have been providing support.

5f User Participation

A demo or open beta of the app will be available to a large number of users to get their reviews and feedback. In this case, a large amount of people will be contributing to our app development since they will be reporting bugs, glitches, or anything they find unsatisfactory about the app. Then, from the input given by the open-beta users the app will be updated and adjusted to the opinions of the users. Therefore, the users will be participating during the development of the product to a great extent.

5g Priorities Assigned to Users

Some users are more important to the project than others to a great extent. For example, the student population, looking to attend classes and connect with their peers using our software would have a great say towards the future of the application. The more the software becomes popular within the students, the more various institutions will be compelled to change their existing software with ours, thus increasing its popularity and

demand. This comes with the added benefit of increased revenue for the client. Therefore, foremost priority would be to make PassMe the favorite online communication tool used by students.

6 Mandated Constraints

6a Solution Constraints

One of the constraints will be the time limit since it greatly affects the outcome of the product. The amount of time given is only possible for creation of the product demo and not the finished product. The product might not have gone through rigorous testing and thus there could be bugs in our product. Another constraint is the lack of programmers. There are not enough software engineers on this project therefore progress on the product may be slowed due to the lack of manpower.

6b Implementation Environment of the Current System

The application will be able to run on all types of operating systems. It would also work on all types of smartphones, including Android, IOS, among others. The application will be able to run on PC's, laptops, mac books, chrome books, etc. To use the software to the fullest, the "TouchPods" will be a requirement. Speakers, microphone and webcam are also needed for correctly using the software. The technical details are as follows -

System requirements

- An internet connection – broadband wired or wireless (3G or 4G/LTE)
- Speakers and a microphone – built-in, USB plug-in, or wireless Bluetooth
- A webcam or HD webcam - built-in, USB plug-in, or:
    - An HD cam or HD camcorder with a video-capture card
    - Virtual camera software for use with broadcasting software like OBS or IP cameras

Supported operating systems

- macOS X with macOS 10.9 or later
- Windows 10*
    Note: Devices running Windows 10 must run Windows 10 Home, Pro, or Enterprise. S Mode is not supported.
- Windows 8 or 8.1
- Windows 7
- Ubuntu 12.04 or higher
- Mint 17.1 or higher
- Red Hat Enterprise Linux 6.4 or higher
- Oracle Linux 6.4 or higher
- CentOS 6.4 or higher
- Fedora 21 or higher

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- OpenSUSE 13.2 or higher
- ArchLinux (64-bit only)

Supported tablet and mobile devices

- Surface PRO 2 or higher and running Win 8.1 or higher
  Note: Tablets running Windows 10 must run Windows 10 Home, Pro, or Enterprise. S Mode is not supported.
- iOS and Android devices
- Blackberry devices

Supported browsers

- Windows: Internet Explorer 11+, Edge 12+, Firefox 27+, Chrome 30+
- macOS: Safari 7+, Firefox 27+, Chrome 30+
- Linux: Firefox 27+, Chrome 30+

Processor and RAM requirements

	Minimum	**Recommended**
Proces sor	**Single-core 1Ghz or higher**	**Dual-core 2Ghz or higher (Intel i3/i5/i7 or AMD equivalent)**
RAM	**N/A**	**4 Gb**

Notes:

- Dual and single-core laptops have a reduced frame rate when screen sharing (around 5 frames per second). For optimum screen-sharing performance on laptops, we recommend a quad-core processor or higher.
- Linux requires a processor or graphics card that can support "OpenGL 2.0" or higher.

Bandwidth requirements

The bandwidth used by the application will be optimized for the best experience based on the participant's network. It will automatically adjust for 3G, WiFi, or wired environments.

Recommended bandwidth for meetings and webinar panelists:

- For 1:1 video calling:
  - For high-quality video: 600kbps (up/down)
  - For 720p HD video: 1.2Mbps (up/down)
  - For 1080p HD video: 3.8Mbps/3.0Mbps (up/down)
- For group video calling:
  - For high-quality video: 1.0 Mbps/600kbps (up/down)
  - For 720p HD video: 2.6Mbps/1.8Mbps (up/down)
  - For 1080p HD video: 3.8Mbps/3.0Mbps (up/down)
  - For gallery view receiving: 2.0Mbps (25 views), 4.0Mbps (49 views)
- For screen sharing only (no video thumbnail): 50-75kbps
- For screen sharing with video thumbnail: 50-150kbps
- For audio VoiP: 60-80kbps
- For Zoom Phone: 60-100kbps

Recommended bandwidth for webinar attendees:

- For 1:1 video calling: 600kbps (down) for high-quality video and 1.2Mbps (down) for HD video
- For screen sharing only (no video thumbnail): 50-75kbps (down)
- For screen sharing with video thumbnail: 50-150kbps (down)
- For audio VoiP: 60-80kbps (down)

6c Partner or Collaborative Applications

The software would not have any partner or collaborative applications, but should be compatible with online collaboration environments as mentioned under section 3d.

6d Off-the-Shelf Software

The software would not require any COTS as long as it fulfills the technical and hardware requirements of the device it is being operated on.

6e Anticipated Workplace Environment

The software is expected to be used indoors (to avoid excessive sunshine, which can distort the image on the screen), with good internet connection. The software will have its speakers active at all times, thus it is expected to be used as some place where noise can be tolerated, or wherever headsets can be worn.

6f Schedule Constraints

The development stage must be done before the debugging period. It would be most beneficial to us if the product is completed as soon as possible as this will give us more time to debug and improve upon our current project. There is too little time for a finished version of the application. Therefore, the app will mostly be in the form of a demo that can be further improved upon.

6g Budget Constraints

As of this moment, we currently do not have any budget restrictions. We have the necessary funding to launch the start of our project. Our project is funded by our stakeholders. If we do experience limitations on funding, it can be due to one of the stakeholders not being interested in the product. If any issues do arise, we would like our stakeholders to be open to us and we hope we can improve the product, so we can get the necessary funding in order for our product to be successful.

7 Naming Conventions and Definitions

7a Definitions of Key Terms

Pass me uses a unique terminology to differentiate certain objects some of the terms are the following:

Baton: refers to a virtual object that is being "passed" among the users of the application.

Student: Is an individual enrolled in the system as a student, a student must be enrolled in at least one class in order to be considered as such.

Teacher: A member of the faculty that has permission to be the moderator of the classroom.

Classroom: a classroom is composed of at least one teacher and at least one student. It refers to a virtual space where students and teachers can meet.

Moderator: any teacher that is assigned to teach a certain subject.

Faculty: Set of teachers.

Classmates: From the point of view of a student it refers to all the students in the classroom minus a specific student.

Quiz group: Is a set of at least two or more students that are grouped together in order to perform a quiz assigned by a moderator.

Subject: refers to the name of a specific class.

Quiz: Is a test of knowledge given from teachers to students.

Emoji: Virtual physical representation of any individual uses the system.

User: Any individual who uses the system.

7b UML and Other Notation Used in this Document

The following is a use case of a typical scenario. The teacher can create a quiz, form groups, request the last student holding the baton. During class, a student can pass the virtual baton, view group partners created by the teacher and solve a quiz. Both, student and teacher, can create an emoji.

pass_Baton()	Function	Changes the baton position to the next student
create_Emoji()	Function	Creates emoji
create_Group()	Function	Creates quiz group
create_Quiz()	Function	A teacher can create a quiz
request_Baton()	Function	The teacher receives the name of the person with the baton
view_Quiz()	Function	Gives a list of the questions in the quiz
view_Group()	Function	Gives a list of the users in the group

The following diagram shows the relationship between the main aspects of the system. A user is any individual who uses the system with the ability to create an emoji. Students are allowed to view quizzes, and pass a baton during a regular lecture. A teacher can obtain the name of the person holding the baton at any moment.
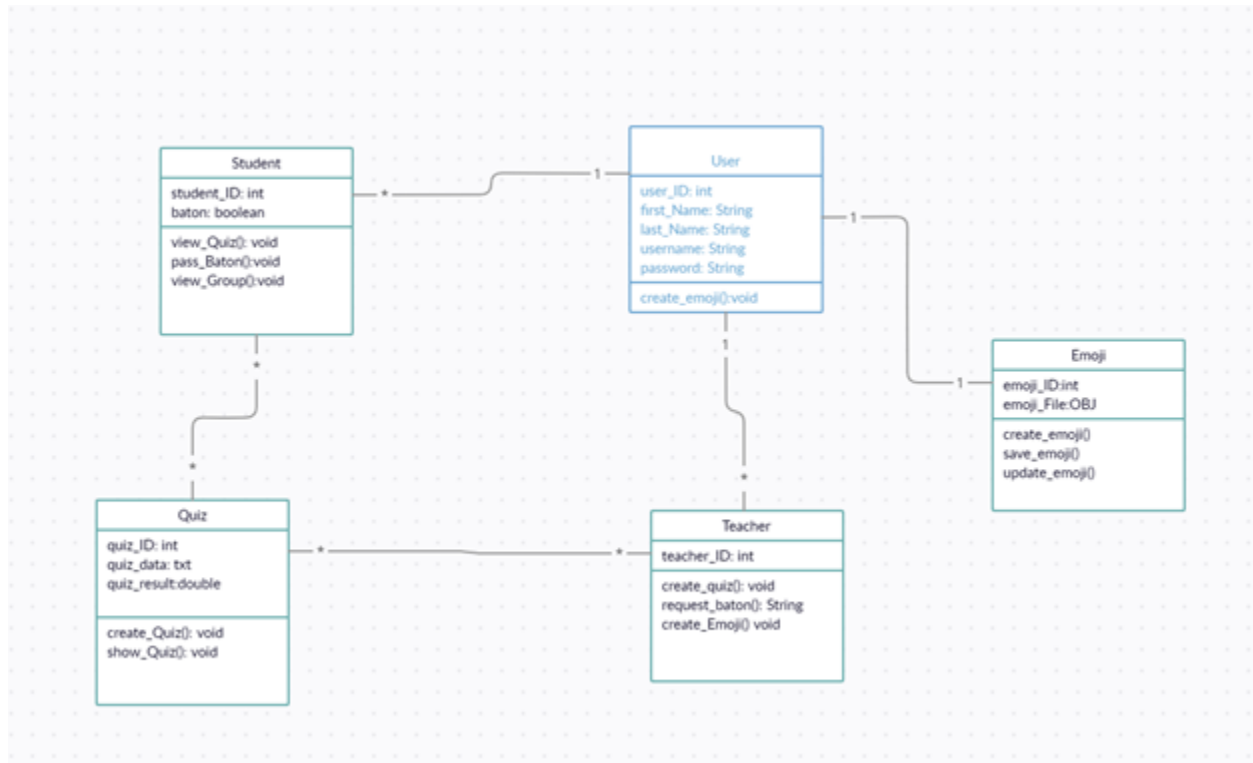
7c Data Dictionary for any included Models

Field Name	Data type	Description	Example
quiz_result	double	Contains the grade of a specific quiz	100.0
first_Name	String	Contains the name of the user	Carlos
baton	boolean	If true a student has the virtual baton otherwise another student in the class	DNA
password	String	Login password	CS4402021
last_Name	String	Last name of the user	Escobar
quiz_Data	txt	Includes the data of the quiz	A text file
username	String	Username of any individual who uses the system	tsarin
Emoji_ID	int	Primary key that identifies a particular emoji	16539824
Emoji_File	OBJ	File that contains 3-D characteristics of a particular emoji	OBJ file

Teacher_ID	int	Primary key that identifies a particular teacher	95656572
User_ID	int	Primary key that identifies a particular user	13654876
Student_ID	int	Primary key that identifies a particular student	98756134

8 Relevant Facts and Assumptions

8a Facts

Class participation is a strategy used by professors to increase and improve the learning experience of their students. This strategy is considered to promote active learning; it benefits critical thinking, listening and speaking skills, as well as attention and involvement in the classroom.

The presentation of the lesson influences the degree of student participation, it should be entertaining, clear, organized and dynamic, with abundant examples and questions to the students. Pass-Me is intended to create a perfect environment in order to promote student participation.

Teacher's supervision increases participation. The progress of the work of all students should be constantly reviewed, even those who do not ask for help, as they may not have understood well or are sometimes too shy to ask. In an online learning environment this is something hard to manage, shy students are not being included therefore their participation decreases, that is why the use of Pass-Me would greatly increase the random participation of any student in the class.

Students are more active when faced with well-defined tasks related to the real world. The job requirements and the steps to follow should be clearly specified. This will prevent students from getting lost, they will be able to move forward and relate each stage to the next, and they will be motivated to get the answer.

Students should receive frequent feedback in order to be engaged in class." Active class participation also improves critical and higher-level thinking skills. Students who participate in class have studied the material well enough to introduce new concepts to their peers. This level of thinking goes beyond simple comprehension of text and can also improve memory. Participation can also help students learn from each other, increasing comprehension through cooperation. This can in turn improve relationships between students and between the student and professor." (Tyson Schritter-How to participate in class and why it's important".

Students are often afraid to participate in class because they do not want their classmates to make fun of them. This is one of the reasons why an environment of participation is needed in order to obtain the benefits from in-class participation. In an online learning environment participation is not usually being promoted. Facilitating class discussion is paramount to increase participation in class.

In an article wrote by Larry Ferlazzo in his article "Five ways to boost student participation in remote learning" is explained 5 ways in how participation can be increased in the classroom environment this are the following:

1)   Help students form habits: Ask them to do one or two simple things regularly.

2)   Emphasize the chance to see their friends.

3)   Show students that their peers are turning up.

4)   Make it easy for students to respond, then celebrate their responses.

5)   Plan to relaunch.

Pass-Me considers these needs and creates a participation environment where students can freely participate and where the professor can keep track of those students who do not often participate in class. Such information is useful for the professors because they can make those students participate more in class.

8b Assumptions

Pass-Me is an application that wants to promote the participation of students during class for this reason assumptions have been made in order to ensure the proper use of the system allowing students to engage in class and ask subjects related to the class.

Assumption 1: Users have basic knowledge on the use of web browsers.

In an online learning environment, the use of technology is paramount to a good use of the resources offered in class. For this reason, is assumed that students using Pass-Me have a good understanding of how a web browser works.

Assumption 2: The class is interactive and allows users to express their ideas.

There are classes where students are not allowed to participate because of time constraints. For instance, online classes that are asynchronous.

Assumption 3: Users have the proper equipment.

For online classes students must have a computer with at least the minimum requirements to execute a web browser. Such equipment must include a working microphone and speakers.

Assumption 4: The teacher knows how to operate Pass-Me.

Tutorials must be offered to teachers in order to ensure the use of all the characteristics of the application.

Assumption 5: At least more than one student is attending a class.

To obtain the benefits of Pass-Me at least more than one student must be attending the synchronous session of the class. In this way students can pass the baton to one another and participate in class.

II Requirements

1 Product Use Cases

1a Use Case Diagrams
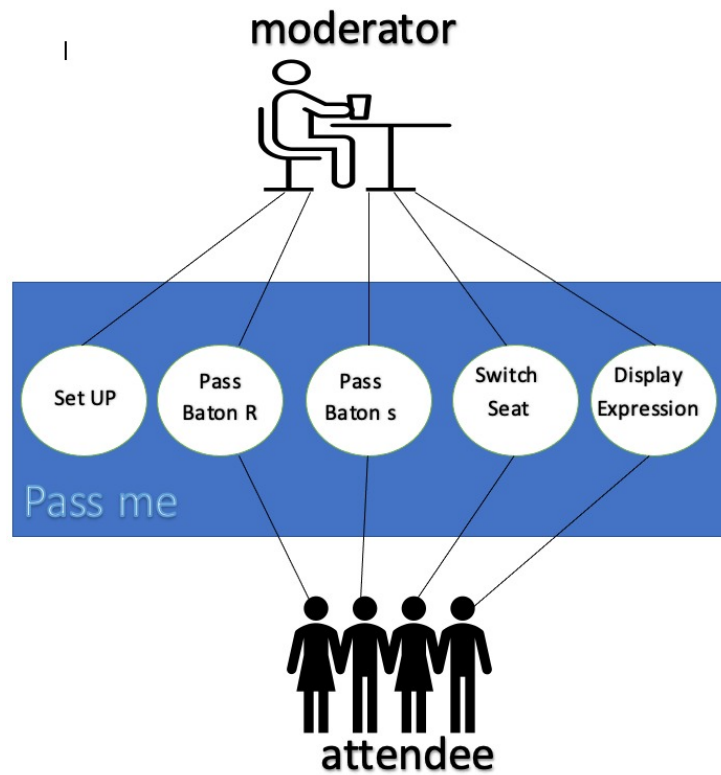
Figure 3 - Use Case Diagram for PassMe

1b Product Use Case List

ID	Name
1	Set Up
02-01	Pass Baton R
02-02	Pass Baton S
3	Switch Seat
4	Display Expression

1c Individual Product Use Cases

Use case ID: 01   Name: Set Up

pre-conditions: an active collaborative meeting on a supported platform

post-conditions: existence of a virtual representation including all attendees

Initiated by: User

Triggering Event: < 1 second on activation of Plug-in (run)

Additional Actors: Moderator

Sequence of Events:

1. User/Moderator activates PassMe on a supported platform.

2. System response follows to input a list of all attendees from the parent platform.

3. Previous event completion succeeds to create an icon for each attendee.

4. System places all attendee icons in a representation of classroom settings.

5. System returns the connected attendee list in the data structure and matches them to their generated icon.

Alternatives: A virtual setting exists and only icons need to be merged.

Exceptions: A user already has a previously generated icon which can be used.

Use case ID: 02-1   Name: Pass Baton R

pre-conditions: active virtual set up.

post-conditions: one or more attendees possess a virtual baton (question alert)

Initiated by: Moderator

Triggering Event: creation of in-class question or enable of Virtual Baton.

Additional Actors: Attendee/Receiver

Sequence of Events:

1. Moderator/Attendee enables an option to pass a baton.

2. System response follows to choose a random attendee from a participants list.

3. Chosen participant receives a baton alert.

4. Participant response is recorded and suitable action is followed.

5. If a participant accepts the baton, they possess it, else, it is passed to some other random participant.

Alternatives: Some other participant who doesn't receive a baton wants to respond.

Exceptions: No participant accepts a virtual baton, this should be alerted.

Use case ID: 02-2   Name: Pass Baton S

pre-conditions: active virtual set up.

post-conditions: one attendee possess a virtual baton (question alert)

Initiated by: Attendee

Triggering Event: choosing an option to pass a received baton.

Additional Actors: Moderator

Sequence of Events:

1. Attendee or a Moderator chooses an option to pass a received baton.

2. System response follows to display a participant list with all connected attendees who can possibly receive a baton.

3. The current receiver/viewer response is recorded and chosen participant receives a baton alert.

4. Participant response is recorded and suitable action is followed.

5. If a participant accepts the baton, they possess it, else, it is passed to some other random/specific participant.

Alternatives: Some other participant who doesn't receive a baton wants to respond.

Exceptions: No participant accepts a virtual baton, this should be alerted to the moderator.

Use case ID: 03   Name: Switch Seat

pre-conditions: active meeting with a virtual set up.

post-conditions: user is represented at wished location if conditions allow.

Initiated by: Attendee

Triggering Event: choosing an option to switch attendees' positions.

Additional Actors: Moderator

Sequence of Events:

1. Attendee chooses an option to switch their position in the virtual representation.

2. System records a list of available positions and displays them to the attendee.

3. The attendee response is recorded and seat change switch alert is generated if the seat is not vacant.

4. Alert receiver request is recorded (default if seat is vacant).

5. If a request is accepted, the requester is now displayed at the requested position, elbow partners are updated accordingly.

Alternatives: The request needs to be cancelled if attendee wishes.

Exceptions: No vacant seat is available and no taken seat attendee accepts request to switch seats.

Use case ID: 04   Name: Display Expression

pre-conditions: active meeting with a virtual set up.

post-conditions: user expression is represented at virtual display.

Initiated by: Attendee

Triggering Event: choosing an option to display attendees' expression.

Additional Actors: Moderator

Sequence of Events:

1. Attendee chooses an option to display their expression in the virtual representation.

2. System response follows to display a set of default student-mojis which the attendee can choose from.

3. The attendee response is recorded and a chosen expression is displayed at the virtual classroom board and chat panel.

Alternatives: The attendee could have had previously self-customized student-mojis which can also be displayed.

Exceptions: No available default expression.

2   Functional Requirements

ID#F1 - Virtual Representation

Description: The application should have an option for the users to be able to view the attendees of a virtual meeting in some human-like representation, settled in the required environment, like a classroom.

Rationale: Enables the users to feel more connected to other virtual participants in more in-person like setting but still being able to stay remote.

Fit Criterion: Attendees and Moderators should have a dedicated seating position in the display which can be switched as per choice, it should match with the original connected participants list.

Acceptance Tests: F1-1, F1-2

ID#F2 - Interaction

Description: The application should have interactive features for the users to be able to communicate with other attendees in the same meeting.

Rationale: Enables the users to feel more engaged to other virtual participants, providing a more in-person like interactions but still being able to stay remote.

Fit Criterion: Moderators should be able to record and inspect attendee interactions to scan for inappropriate communication.

Acceptance Tests: F2-1, F2-2

3 Data Requirements

ID#D1 - Attendee Details

Description: The application should maintain a database where Attendee information like name can be stored along with privileges they might have and statistics on their classroom participation.

Rationale: It is necessary to have this information for future meetings as Attendee will have more flexibility in running default behavior.

Fit Criterion: Any participant joining a meeting should have a record for some of their information which can be used to track their presence or participation.

Acceptance Tests: D1-1, D1-2

ID#D2 - Moderator Details

Description: The application should maintain a database where Moderator information like name can be stored along with detail about their moderated meetings they might have and statistics on their classroom controls.

Rationale: It is necessary to have this information for future meetings as Moderators will have more flexibility in running default behavior and control.

Fit Criterion: Any moderator joining a meeting should have a record for some of their information which can be used to track their presence, participation and controls.

Acceptance Tests: D2-1, D2-2

4 Performance Requirements

4a Speed and Latency Requirements

The product should be fast, and should have no or minimal lag between its data packages so that the users are able to share their videos and voices without any delay.

ID #P1 - PassMe Usage

Description: The software must be able to create a virtual model of the classroom, as well as the students present in it. The virtual figures should show movement based on the options selected by the user.

Rationale: The goal of the software is to make distance learning and distance communicating, a lot more fun and interactive

Fit Criterion: If a classroom with virtual figures is visible on the screen, and communication is possible via voice and video share, then, the product would meet the fit criterion.

Acceptance Tests: UT-1, UT-2

4b Precision or Accuracy Requirements

ID #P2 - Sound and Video Features

Description: The software should enable the user to communicate via either voice chat, video chat, or both. There should be minimal latency and minimum loss of data packets between any call.

Rationale: Communicating in an efficient way is one of the key features of PassMe

Fit Criterion: A system check to confirm the connectivity of mike and video devices from both communication ends, along with an internet speed check would meet the fit criterion

Acceptance Tests: S-1, V-2

4c Capacity Requirements

ID #C1 - Basic Platform Requirements

Description: The system on which the software needs to be run, should at least be able to connect to the internet, and run video and audio files at the same time. It

should have a minimum OS: Windows 7 or higher (windows devices), macOS 10.10 or higher (Mac devices).

Rationale: In order for video and sound requirements, along with connecting to the internet and using various services, the devices must have some pre installed drivers which are critical to its functionality.

Fit Criterion: A working PassMe environment, with minimal glitches in the audio and video feed would satisfy the fit criterion.

Acceptance Tests: PT-1, PT-2

5 Dependability Requirements

5a Reliability Requirements

ID #9 - Reliability of PassMe

Description: The software might fail only when feature updates and bug fixes are being performed on the website mode, however, the desktop application should keep working without issue, or, when the servers are facing an unexpected downtime.

Rationale: Server overload, power failure or natural disasters could be some of the causes which might affect the reliability of PassMe once in a century, as all efforts will be made to reduce any possibility of downtime.

Fit Criterion: The application will be down only when servers have cracked severely, otherwise it would not fail.

Acceptance Tests: RT-1, RT-2

5b Availability Requirements

ID #10 - Availability

Description: The application would be available 24/7 and can be started and closed at the demand of the user.

Rationale: The application would connect the users via servers or cloud, which should not face any downtime.

Fit Criterion: If the user can successfully log in and can connect a meeting, it would signify the fulfillment of the fit criterion.

Acceptance Tests: AvT-1, AvT-2

5c Robustness or Fault-Tolerance Requirements

ID #11 - Latency Adjustments

Description: When faced with network connectivity issues, the application would prioritize voice accessibility, and would shut down the usage of other features (such as, video share, PassMe Baton device usage, virtual appearance of student moji, etc).

Rationale: The application works using the power of the internet, so, if the internet is down, or slow, then connecting individuals would prove to be difficult.

Fit Criterion: Automatic closing of video features among other things would signal the fit criterion.

Acceptance Tests: LaT-1, LaT-2

5d Safety-Critical Requirements

ID #12 - Safety Measures

Description: The software would warn the user if the mike volume is near or above the threat threshold in order to prevent hearing loss, etc.

Rationale: Safety of our users, enabling them to enjoy connecting with other people, in a fun environment is a top priority of our development team.

Fit Criterion: Displaying a warning message, giving users the option to reduce volume if they agree would be suitable for fit criterion.

Acceptance Tests: ST-1, ST-2

6 Maintainability and Supportability Requirements

6a Maintenance Requirements

ID #13 - Maintenance Demands

Description: The software's user interface will have upgrades in the future, which would work in order to make the functionality earlier for the user. The future versions will come out with even more special features, and there will be constant updates given to the student moji's available to the users. Along with this, the database storing user's data would also be updated to keep the software fast. The development team would initially perform bi-weekly maintenance, and would later on shift down to monthly maintenance.

Rationale: Databases can be prone to glitches since they're constantly being updated. So, the DBs need to be maintained on a frequent basis to ensure that nothing important has changed in the process. The UI will also be updated based on user feedback in order to ensure a smooth experience while using our software.

Fit Criterion: If the software allows the user to log-in, keep the data from the previous profile changes, and allows the user to connect to a call, enabling him to

use all the features of PassMe, then the product would pass the fit criterion requirement.

Acceptance Tests: MT-1, MT-2

6b Supportability Requirements

ID #14 - User/Client Help

Description: There will be a customer service team that will help users with any questions or comments. They should be available on business days from 9 AM to 5PM CST. Furthermore, the app will also have a "report bug(s)" option that will send user feedback(s) to the system.

Rationale: It's hard to program everything perfectly, and humans are prone to mistakes. We should be humble enough to admit that we can have lapses in judgment, and we should be open to users' constructive criticisms. They're the folks we are ultimately trying to serve.

Fit Criterion: We need to make sure that the customer service component is working properly.

Acceptance Tests: HT-1, HT-2

6c Adaptability Requirements

ID #15 - Compatibility

Description: The app should be compatible with most contemporary types of phones such as Androids, iPhones, or any others, as well as other devices that use MacOS, Windows, Linux Distros, etc.

Rationale: The aforementioned types of phones and OS's are among the most popular ones that people generally use, so it makes more sense to ensure that adaptability requirements are met in this regard.

Fit Criterion: The app can work on each type of device mentioned above without any glitches.

Acceptance Tests: AT-1, AT-2

6d Scalability or Extensibility Requirements

ID #15 - Growth Possibilities

Description: We expect the user database to grow within the first two years and the database will be able to handle more than 3,000,000 users. As the users grow, we will do weekly maintenance to handle more users and meet the demand. As PassMe would also record the sessions based on user requests, storing the recordings on cloud will also take up a lot of space.

Rationale: Storing videos online can take up a lot of space, and in order to maintain a smooth functionality at the time of traffic (during a group call/meeting), the servers for the product would need to be upgraded as the traffic increases.

Fit Criterion: The database keeping track of user information and their settings, and the application allowing all users to connect without facing any latency issues would fit the criterion.

Acceptance Tests: ET-1, ET-2

6e Longevity Requirements

ID #16 - Longevity

Description: The app is meant to last until the end of the technological world or for as long as it continues to get sufficient funding.

Rationale: The system will continue to run for as long as the product continues to generate revenue via advertisements or memberships. Unless something truly disruptive happens (like a mass-scale war that puts the world at stake or insufficient funding), there is no reason to believe the app would not continue to go on until the very end of the world.

Fit Criterion: The system behind the app continues to run normally for extended periods of time while it gets funded by advertisements and user memberships.

Acceptance Tests: LT-1, LT-2

7 Security Requirements

Pass me has 3 different types of users, students, teachers and administrators. Each of them has a different level of access to the system. The most basic user is a student with the ability to create an emoji, participate in class and pass the baton. The second user type is a teacher with the ability to collect the baton, create an emoji, see a list of the students in the class, create quizzes and some other functionalities previously described in the document. The third type of user are the administrators with the ability to delete classes, reassign teachers to other classes and delete or add users to the database.

7a Access Requirements

ID# - AC-Login

Description: The only users allowed to access the system are students, teachers and administrators.

Rationale: The administrators will be able to register teachers and assign them to any class.

Fit Criterion: Any user belonging to a determined class, any teacher teaching a course and an administrator designated by the university.

Acceptance Tests: AC-1, AC-2

7b Integrity Requirements

ID# - IR-Administrators

Description: In order to make sure that corruption of data and unauthorized users are not allowed in the system administrators will have the final say on what users are allowed to access the system.

Rationale: Administrators are the only ones allowed to delete users, they are responsible for making copies of the database and the system in case of any failure.

Fit Criterion: An administrator must be someone with coding and database experience, be reliable and with outstanding knowledge on the security of the system.

Acceptance Tests: IR-1, IR-2

7c Privacy Requirements

ID# -PR-Quizzes

Description: In order to maintain the privacy of every user the access to any information of the user will be limited to the user itself.

Rationale: Users will have access to only the information created by themselves.

Fit Criterion: Once a student completes a quiz the grade will be available to only him and the teacher.

Acceptance Tests: PR-1, PR-2

7d Audit Requirements

ID# - AR-Scores

Description: Every semester scores are to be updated onto the main system of the university.

Rationale: Scores are not supposed to change after a week has passed.

Fit Criterion: Scores will be updated every week by the administrators.

Acceptance Tests: AR-1

7e Immunity Requirements

ID# - IR1-Virus-Resistant

Description: The system must be built to be strong enough to withstand viruses such as worms, trojan horses and many other viruses that are created every day.

Rationale: Administrators will run different tests on the system to make sure that the system is properly functioning.

Fit Criterion: Every test must be passed in order to consider the system in a proficient state.

Acceptance Tests: IR1-1, IR1-2

8 Usability and Humanity Requirements

8a Ease of Use Requirements

ID# -ER-User-Friendly

Description: The system should make use of different font colors and size in order to make it easier for the user to use it.

Rationale: The baton button must be easy to use for any user.

Fit Criterion: Any user must be able to use the system without any problem.

Acceptance Tests: ER-1, ER-2

8b Personalization and Internationalization Requirements

ID# -PIR-User-Accessible

Description: By default the baton button would light up red, but taking into account students with disabilities the color might be changed by the user.

Rationale: Users can change the color of the batton.

Fit Criterion: Any student must be able to change the color of their batton.

Acceptance Tests: PIR-1, PIR-2

8c Learning Requirements

ID# -LR-User-Usable

Description: Students and teachers must be able to see their respective classes on the main panel of the application and access to every course with a single click.

Rationale: The system must be designed to be easily understandable for any user.

Fit Criterion: Once a user logs into the system a panel showing them different options must be displayed.

Acceptance Tests: LR-1, LR-2

8d Understandability and Politeness Requirements

ID# -UP-Manageability

Description: The system must be designed with a professional look, showing that it is intended for academic purposes.

Rationale: Pass me is a way to increase student interaction during class.

Fit Criterion: An introduction to the use of Pass me must be displayed once a user creates an account.

Acceptance Tests: UP-1, UP-2

8e Accessibility Requirements

ID# - AR1-Users-Disability

Description: Students with different disabilities are expected to use the system, for this reason pass me must support some of the requirements for users of this kind.

Rationale: Taking into account that the system must be used by people with any kind of disability pass me must provide a way for every type of user to interact with the system.

Fit Criterion: Students with limited vision must be able to increase the volume in order to listen at the signal alerting them that the baton has been passed to them.

Acceptance Tests: AR1-1, AR1-2

8f User Documentation Requirements

ID# -DR-Help-Assistance

Description: A help button must be provided in order to provide feedback to common questions while using the application.

Rationale: Feedback must be provided to students to ensure the usability of the system.

Fit Criterion: Teachers and students must be able to ask questions to the administrators of the system.

Acceptance Tests: DR-1, DR-2

8g Training Requirements

ID# - TR-Training

Description: Teachers must be trained by the administrators on how to use the system, teachers will have to train students on how to use the application.

Rationale: Support must be provided to ensure the full use of the potential of the system.

Fit Criterion: Teachers must be able to explain the usability of the system to students, tutorials will also be provided in case of immediate assistance.

Acceptance Tests: TR-1, TR-2

9 Look and Feel Requirements

9a Appearance Requirements

ID# - LF1-Appearance

Description: An aesthetically pleasing appearance must be provided to the users to ensure that they can find everything needed for them in the application.

Rationale: When a system is built using a determined criteria reflecting the requirements and the usability of the system things such as colors and fonts are properly used ensuring that the user will have a proper understanding of the application.

Fit Criterion: Logos, colors and fonts must be used according to a unique palette used through the creation of the system.

Acceptance Tests: LF1-1, LF-2

9b Style Requirements

ID# - LF2-Styles

Description: The use of a unique proper style is needed for the users to interact with the system ensuring that students will not have distractions at the time of using the application.

Rationale: The appearance of the system must provide users with a proper management of space and allow them to easily interact with the application.

Fit Criterion: The system must make sure to let the user know in what part of the system they are currently using.

Acceptance Tests: LF2-1, LF2-2

10 Operational and Environmental Requirements

10a   Expected Physical Environment

ID#OE1 - Physical Environment

Description: The plugin improves the experience of students and teachers in a virtual environment. Our product simulates a classroom like experience right on your desktop/laptop, hence during these times of a pandemic students can continue active learning from the comfort and safety of their homes and likewise teachers can continue to educate with full efficiency "remotely".

Rationale: All the aspects/features of the app can be used and availed from anywhere in the world hence one does not need a physical classroom to conduct or attend a classroom session. All that is required is an active wifi connection.

Fit Criterion: The app properly shows the number of students, teacher/prof. along with their names and seating arrangements on the screen of a client.

Acceptance Tests: OE1-1

10b   Requirements for Interfacing with Adjacent Systems

ID#OE2 - Partner Systems

Description: The app will be in the form of a plugin to give more functionality and interactiveness to existing prominent platforms like BlackBoard Collaborate and Zoom. Most learning institutions have opted to use these platforms to conduct online learning and our product will provide a substantial upgrade to these platforms.

Rationale: The app should be allowed to act as an extension to BlackBoard Collaborate/Zoom and collect data from these platforms to conduct necessary functions and provide additional features along with the existing ones.

Fit Criterion: Our product must interface with the two platforms mentioned above and be able to exchange, input and output data collected from the students and teachers.

Acceptance Tests: OE2-1

10c   Productization Requirements

ID#OE3 - Product

Description: The product can be downloaded from an up to date version of any modern web browser just like any other plugin one might find on google chrome or safari. The product can be downloaded on a desktop or a laptop setup and can be installed by any untrained user.

Rationale: In order to reach a wide range of audience, we will approach BlackBoard and Zoom to educate their users about the benefits of our products and encourage them to download it from our website.

Fit Criterion: The clients that download our app and use it would be students and teachers, usually from an university level institution.

Acceptance Tests: OE3-1.

10d   Release Requirements

ID#OE4 - RR

Description: The app will be released in increments where each release will add one or two additional features to the host platform depending on the feedback received from the end user. Each year a maintenance release will also be provided to keep the functionality of the app smooth and effective

Rationale: Updating the features of the app little by little will gradually make the users adjust to the new changes and not confuse them.

Fit Criterion: The app should be able to update and keep up with the user's needs.

Acceptance Tests: OE4-1

11 Cultural and Political Requirements

11a   Cultural Requirements

ID#P1 - Cultural Norms

Description: The app should be suitable exclusively for students and teachers.

Rationale: One's cultural group does not have anything to do with the use of this application.

Fit Criterion: The app does not have anything that could be perceived as hostile to any cultural groups.

Acceptance Tests: N/A.

11b   Political Requirements

ID#P2 - Political

Description: The app shall be installed only as a plugin to BlackBoard Collaborate.

Rationale: Our product is a means to avoid the heavy rework of building a whole new platform from scratch, and to upgrade and enhance an existing trusted platform to provide better and more interactive features for remote learning

Fit Criterion: the app is strictly accessible to those who have access to a Bb account of their institution.

Acceptance Tests: P2-1

12 Legal Requirements

12a   Compliance Requirements

ID#L1 - Compliance

Description: The app collects information about the teachers and students through BlackBoard which may contain institutional credentials.

Rationale: The system will only collect information that's relevant to the app itself. We want to avoid lawsuits, fines from the Department of Justice (DOJ) or any legal actions against our product. In order to do so, we will comply with the Data Protection Act, and any other laws that come with protecting consumer data/privacy.

Fit Criterion: We would seek advice/input from lawyers about data protection act. What the act is, how one compiles with the act. We will also file the paperwork that comes along with complying with the Data Protection Act and any other privacy law.

Acceptance Tests: L1-1

12b Standards Requirements
ID#L2 - Standards

Description: The product must conform to the documentation shown in the UML diagrams as well as the activity diagrams. The developers of this project seek to follow AGILE methods so that interactions and changes can be embraced and met with as less rigidity as possible.

Rationale: AGILE methods are required to make changes in the app as soon as relevant feedback is received from the consumer in order to keep the clients satisfied and happy with the product.

Fit Criterion: The team members must adhere to the certified standards of the host platforms.

Acceptance Tests: L2-1

13 Requirements Acceptance Tests

13a   Requirements – Test Correspondence Summary

7.2-Administrators-Test-1	Req 1	Req 2	Req 3	Req 4	Req 5	Req 6	Req 7	Req 8	Req 9	Req 10	Req 11	Req 12	Req 13	Req 14	Req 15	Req 16	Req 17	Req 18	Req 19	Req 20
Test F1-1	X																			
Test F1-2	X	X				X														
Test F2-1	X	X	X																	
Test F2-2	X					X														
Test D1-1		X																		
Test D1-2		X			X															
Test D2-1		X	X																	
Test D2-2			X																	
Test UT-1			X																	
Test UT-2			X																	
Test S-1		X	X																	
Test V-2		X	X																	
Test PT-1			X		X															
Test PT-2			X		X															
Test RT-1		X		X		X														
Test RT-2				X		X														
Test AvT-1				X			X													
Test AvT-2		X		X																
Test LaT-1	X			X																
Test LaT-2	X			X				X												
Test ST-1	X			X		X														
Test ST-2				X																
Test MT-1					X															
Test MT-2					X															
Test HT-1					X	X														
Test HT-2					X	X														
Test AT-1					X															
Test AT-2					X															
Test ET-1					X															

Test ET-2				X						
Test LT-1				X						
Test LT-2				X	X					
Test AC-1						X				
Test AC-2	X		X			X				
Test IR-1						X				
Test IR-2				X		X				
Test PR-1		X				X				
Test PR-2						X				
Test AR-1						X				
Test IR1-1				X		X				
Test IR1-2						X				
Test ER-1							X			
Test ER-2							X			
Test PIR-1						X	X			
Test PIR-2							X			
Test LR-1		X					X			
Test LR-2							X			
Test UP-1			X				X			
Test UP-2							X			
Test AR1-1						X	X			
Test AR1-2		X					X			
Test DR-1							X			
Test DR-2							X			
Test TR-1							X			
Test TR-2			X				X			
Test LF-1						X		X		
Test LF-2								X		
Test LF2-1								X		
Test LF2-2						X		X		
Test OE1		X							x	
Test 10b-1				X	x	X			x	
Test 0E3-1									x	
Test OE4-1			X			X		X	x	
Test P2-1		X								x
Test L2-1									x	
Test L1-1									x	

Table 1 - Requirements - Acceptance Tests Correspondence

13b   Acceptance Test Descriptions

F1-1

    Description: A successful run should be able to display a virtual representation of a meeting setting with participants.

F1-2

    Description: A successful run should have proper representation for each attendee at their wished location.

F2-1

    Description: A successful run should be able to provide some interactive features for the attendees.

F2-2

    Description: A successful run should provide interactive features for each attendee to interact with all or any attendee they want in both group or individual setting.

D1-1

    Description: There should be relevant data stored against the right participant.

D1-2

    Description: Participant should be able to use default messages/expressions stored previously.

D2-1

    Description: Relevant information for Moderators should be stored against the right moderator.

D2-2

    Description: Moderators should be able to use stored default actions for them.

UT-1

    Description: The software is able to display a virtual student moji.

UT-2

    Description: Communicating between at least two people is possible.

S-1

Description: The user should be able to change between various sound ports and select the one with which he can hear a tope being played for testing whether the selected sound port is working or not..

V-2

Description: The user can toggle the video device ports until he can see the image being captured via the video camera.

PT-1

Description: A successful run of the software installation.

PT-2

Description: connectivity to the PassMe's web interface would satisfy the acceptance test.

RT-1

Description: The application would let the user know via their registered email addresses, if the application is going to be offline due to planned maintenance.

RT-2

Description: The application should show the users a downtime screen, giving an estimated time of when the software will be back up again.

AvT-1

Description: The user is able to log into the application via the desktop/mobile app and via website.

AvT-2

Description: The user is able to connect to a meeting via the desktop/mobile app and via website.

LaT-1

Description: Testing done by the developers while limiting internet connectivity would work on acceptance tests.

LaT-2

Description: A dummy call option will be available (just like in Skype), giving the user an option to test his connectivity before connecting to an important event.

ST-1

Description: Increasing mike volume to dangerous levels, and then reducing them via the warning prompt would function as an acceptance test.

ST-2

Description: Giving users a prompt when their mikes and video cameras are being used in order to protect user privacy.

MT-1

Description: The database is glitch free and stores the user information.

MT-2

Description: The User Interface allows setting up meetings after maintenance.

HT-1

Description: We need to ensure that the app's "report bug(s)" option is sending glitch reports correctly.

HT-2

Description: We need to ensure that the Live Chat support feature is working perfectly.

AT-1

Description: The system functions normally while many users use different devices to access the service..

AT-2

Description: The User Interface and the videos during the meetings should not become laggy if a lot of users join.

ET-1

Description: The acceptance test for this will be checking the time it takes for a certain query to execute and retrieve data from the database. If it does not meet our time requirements, we will either increase the maintenance period activity in order to ensure it meets the time requirement.

ET-2

Description: We will also purchase more hardware equipment (eg. more robust servers) as it becomes necessary to ensure a smooth working of the application..

LT1

Description: The app works normally, and this would be checked on a weekly basis. To further confirm how promising the product is, the product team would also ensure that it will be generating revenue sufficiently.

LT-2

Description: Tech Stack and hardware checks would be conducted on a monthly basis in order to keep the technology updates, and to replace any broken piece of hardware machinery.

AC-1

Description: If the information is correct a student will have access to the class, teachers will be able to drop students that are not supposed to be in the class.

AC-2

Description: Once the administrator has been logged in, the developer will ensure that the administrator is able to do all the tasks previously described in the documentation.

IR-1

Description: Administrators will be required to pass a test and show their coding and database manipulation proficiency, they are designated by the rector of the university.

IR-2

Description: Teachers will have to be given an authorization code by the administrator of the university in order to verify that they work for such an entity.

PR-1

Description: The user will take a quiz, he and the teacher are the only ones allowed to see the score of such tests.

PR-2

Description: A teacher is able to view the grades of his students, as well as some useful information given by the system. In the coding phase of the system quizzes must be evaluated making sure that every student is being graded correctly.

AR-1

Description: Administrators will upload quizzes to the main system once a week, the information must be appropriately uploaded ensuring its righteousness .

IR1-1

Description: Administrators must run a virus on a copy of the system to prove that the system is working properly.

IR1-2

Description: Developers must equip the system with virtual shields to decrease any potential damage to the information saved by the system.

ER-1

Description: Users should be able to respond to quizzes and find resources without any struggle.

ER-2

Description: In the development phase of the project the coders must prove the system against the time that it takes to one common user to use one or many of the functionalities of the program.

PIR-1

Description: Once a user changes the color of their batton the changes will be saved in the database.

PIR-2

Description: Verify that the preferences saved by the user are correctly loaded in the system.

LR-1

Description: A common student must be able to enter and register into a class in less than two minutes.

LR-2

Description: A teacher must be able to easily create a quiz and verify the answers given by the students.

UP-1

Description: In a typical class students must see the button lighting up when the baton has been passed to them.

UP-2

Description: In a typical class a teacher must be able to acquire the name of the person holding the virtual baton at any time.

AR1-1

Description: Any user must have a pleasant experience using the application.

AR1-2

Description: A friendly user interface must be built by the developers ensuring that students with disabilities can properly use the system.

DR-1

Description: Every question must be answered and related questions must be redirected to original questions with the answers.

DR-2

Description: Every question or concern presented by the users must be addressed and compared to the system in order to make it easier for future users.

TR-1

Description: A teacher must know how to operate the system as a teacher and as a student.

TR-2

Description: An administrator must be able to know how to upload grades on the main system.

LF-1

Description: The logo of the system must be shown on every page of the application as well as the tile of the page so that the users know where they stand on the application.

LF-2

Description: A test must be created to ensure that the appearance of the application is right for the users.

LF2-1

Description: The overall score given by students to the system must be above 6 in a scale from 1 to 10. An intern test must be created for this purpose.

LF2-2

Description: The overall score given by teachers to the system must be above 6 in a scale from 1 to 10. An intern test must be created for this purpose.

OE1-1

Description: We will check that all the information is correctly displayed on the screen and also the minimum wifi bandwidth which is required for the app to run smoothly.

OE2-1

Description: We will check that the plugin works well with different browsers (Safari,GoogleChrome) and provides the additional content to BlackBoard Collaborate and Zoom properly.

OE3-1

Description: We will check the number of downloads our product gets, and check the reviews of the product.

OE4-1

Description: Each release will be the result of the users' feedback.

P2-1

Description: The download to the plugin will require the clients Blackboard credentials

L1-1

Description: We will check that the app does not infringes any laws

L2-1

Description: The app must be at par with the BB collaborate and zoom standards and the documentations prepared by the team.

III Design

1 Design Goals

What students need is a way to study online which is not only effective but also fun and most importantly interactive. This will be made possible with our software which provides a series of features and tools which makes online learning an experience worth having.

our software will enable the teacher and the student to set their own learning environment, with added flexibility of setting a workplace which is much more similar to the in-person type of classrooms.

2 Current System Design

Pass me aims to close the gap between in person classes and online classes. The main part of this project is the idea of increasing student's participation by passing a virtual baton. This will increase student's success in online classes.

3 Proposed System Design

Pass me counts with two main types of users: the moderators that are also known as teachers and the students.

The moderators can create polls and ask questions, they are also responsible for passing the baton at the beginning of the class.

The students can virtually sit in any of the empty spaces in the virtual classroom, they are also able to pass the virtual baton up to three times per class. Students can also modify their emoji and make expressions.

Another feature of Pass me is the implementation of an interface where the user can perform different tasks such as answering polls and viewing the virtual classroom and the users seated on each virtual spot.
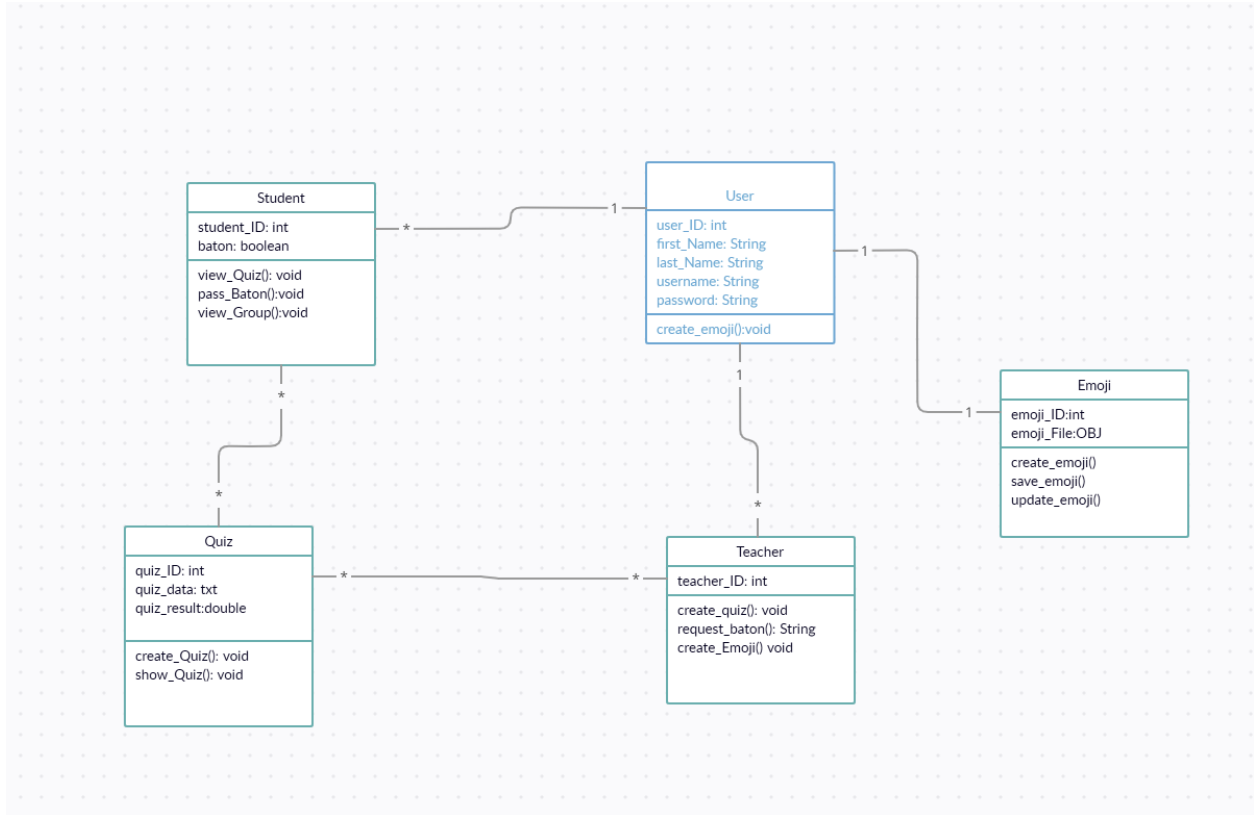
3a Initial System Analysis and Class Identification

In the current system's design Pass me includes some important functions:

- In the baton class we have:

Pass_Baton which allows users to transfer the baton to another classmate.

Request_baton which retrieves the name of the user who is currently holding the baton

- In the emoji class we have:

Create_emoji which allows users to create an emoji

- In the group class we have

Create_group which allows teacher to divide students into mini sections for exams or discussions

View_group which allows the teacher to view the groups previously generated by him

- In the quiz class we have

Create_quiz which allows teachers to generate quizzes and assign points for every question

View_quiz that allows a specific student to see his quiz results

3b Dynamic Modelling of Use-Cases

In a common scenario the student will be able to attend a virtual lecture, pass the baton to another student, switch seats and use emojis.

A moderator or professor will be able to set up a virtual lecture, to randomly assign the baton to a student and to make expressions with his avatar.
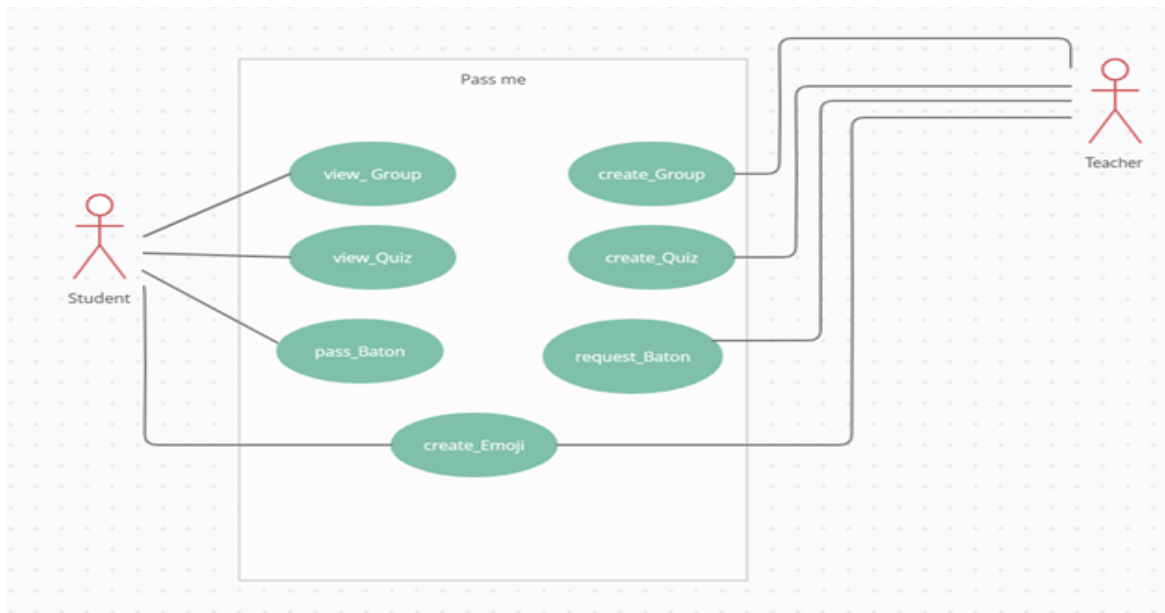
3c Proposed System Architecture

The software architecture to be implemented is a client-server architecture because of the following advantages:
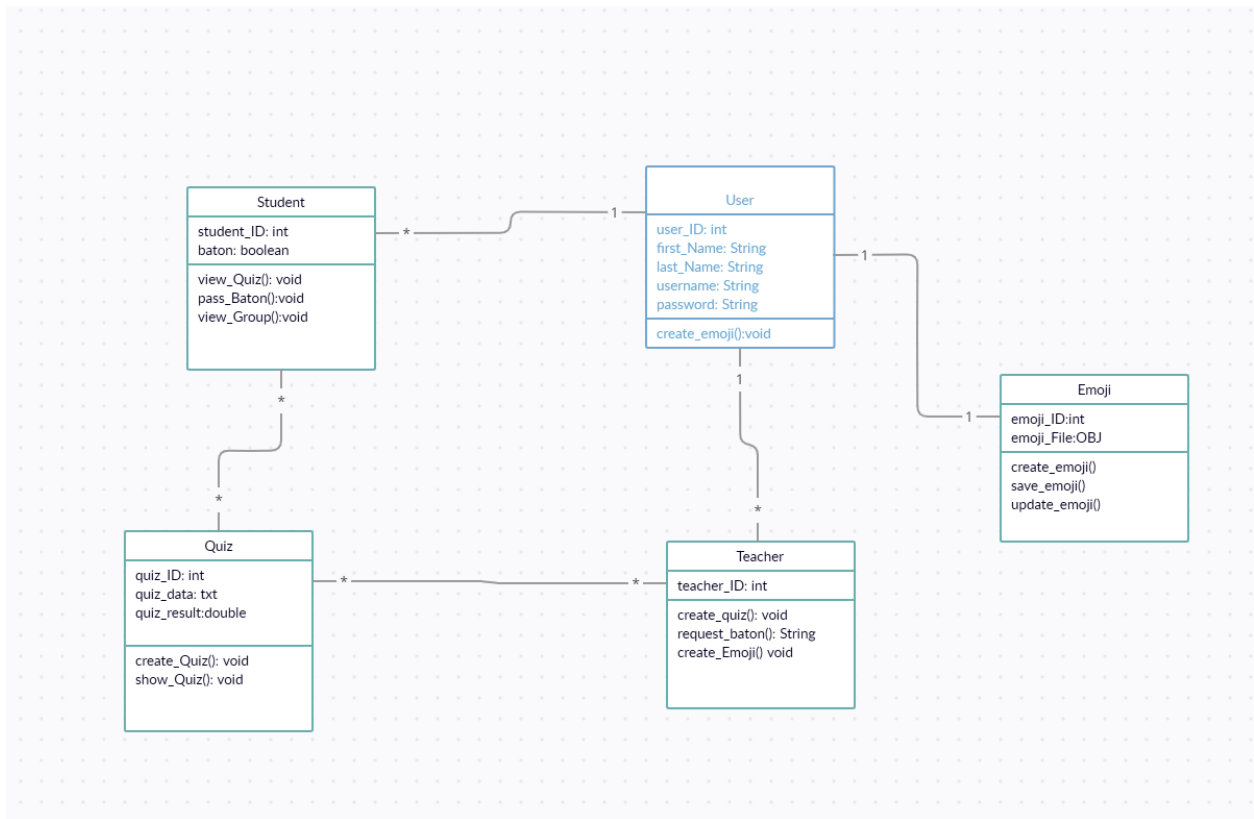
Centralization of control: Access, resources and data integrity are controlled by the server so that a faulty or unauthorized client program cannot damage the system. This centralization also facilitates the task of updating data or other resources (better than in P2P networks).

Scalability: You can increase the capacity of clients and servers separately. Any element can be increased (or improved) at any time, or new nodes can be added to the network (clients and / or servers).

Easy maintenance: Since the functions and responsibilities are distributed among several independent computers, it is possible to replace, repair, update, or even move a server, while your clients will not be affected by that change (or will be minimally affected).

3d Initial Subsystem Decomposition

As previously described the database of Pass-me must be organized in the following way:

pass_Baton()	Function	Changes the baton position to the next student
create_Emoji()	Function	Creates emoji
create_Group()	Function	Creates quiz group
create_Quiz()	Function	A teacher can create a quiz
request_Baton()	Function	The teacher receives the name of the person with the baton
view_Quiz()	Function	Gives a list of the questions in the quiz
view_Group()	Function	Gives a list of the users in the group

4 Additional Design Considerations

4a Hardware / Software Mapping
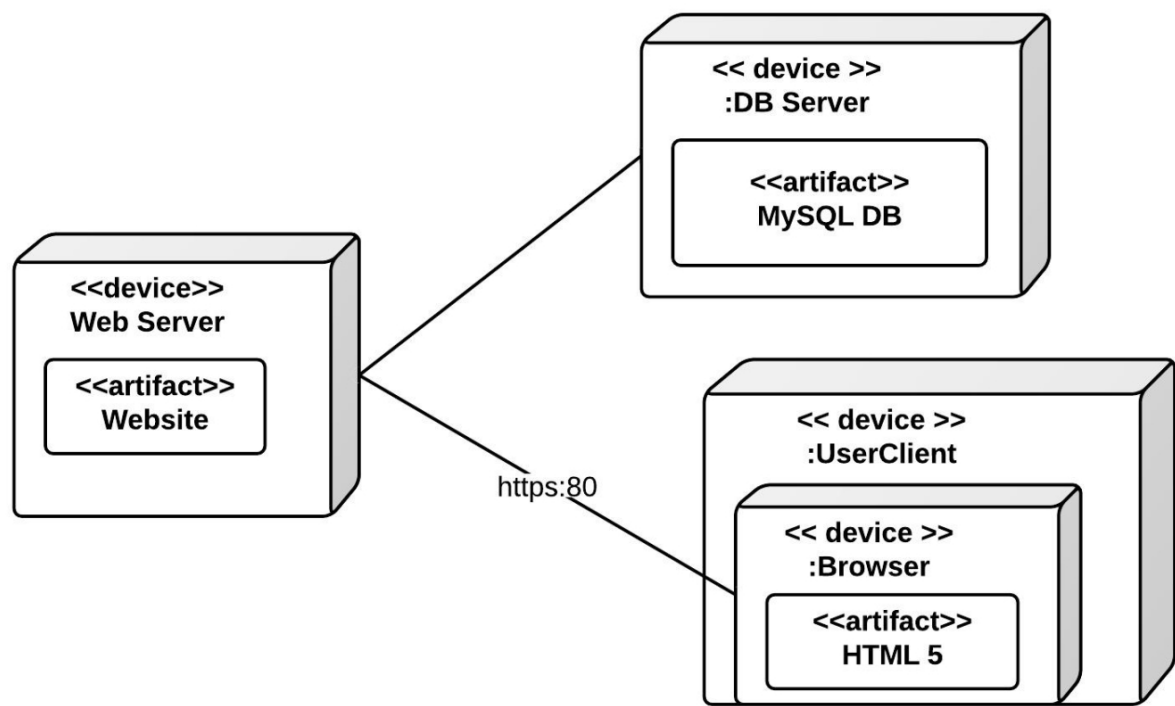
4b Persistent Data Management

The main classes needed for the implementation of Pass-Me are the following

- Baton class

The baton class is needed to store the data about the person holding the baton at any specific time, it also initializes the baton class by assigning the baton at the beginning of every class to a random student.

- Emoji Class

Will hold the values of the characters created by the users so that they can make their emoji the way the user pleases.

- Group Class

Will help to create subgroups in every section. Used when the professor wants to make a small group of discussions and randomly assign students to every group.

- Quiz Class

To help store the information about quizzes and grades in the application.

4c Access Control and Security

The only individuals allowed to use the system are authorized teachers and students that have been previously added into the database of the system provided by the school using the application. In order to handle this functionality a class must be created to gain access to such information.

4d Global Software Control

4e Boundary Conditions

For the system to function in an adequate manner, maintenance to the databases must be provided as well as the upgrade to new technologies.

4f User Interface

The following is an example of how the user interface will look like when developing this project, there is a space named seats which will look like the second image

Class name

Seats

*users
*chats
*groups

Seating Chart

Blackboard

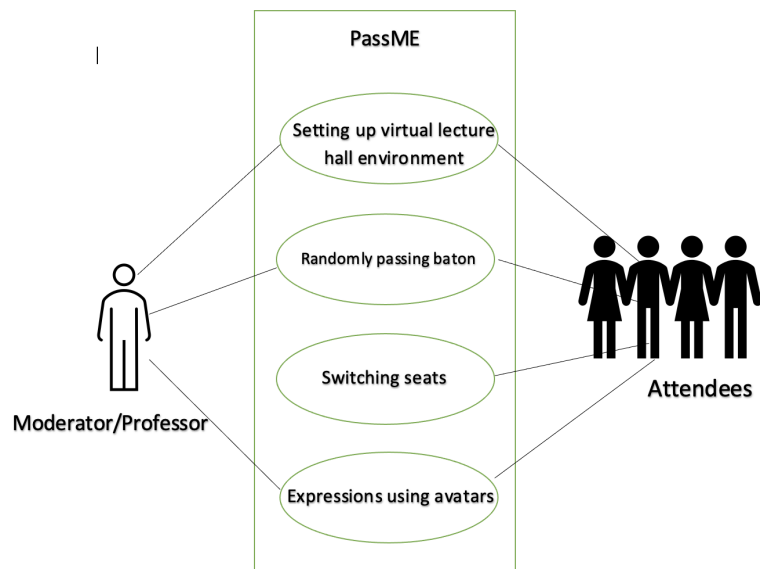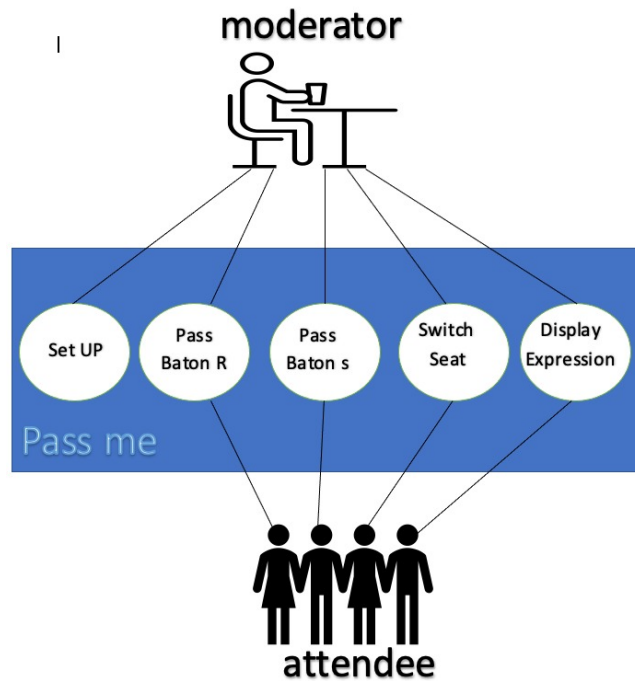| Name	Name	Name	Name	Name	Name
Name	Name	Name	Name	Name	Name
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Name	Name	Name	Name	Name	Name

4g Application of Design Patterns

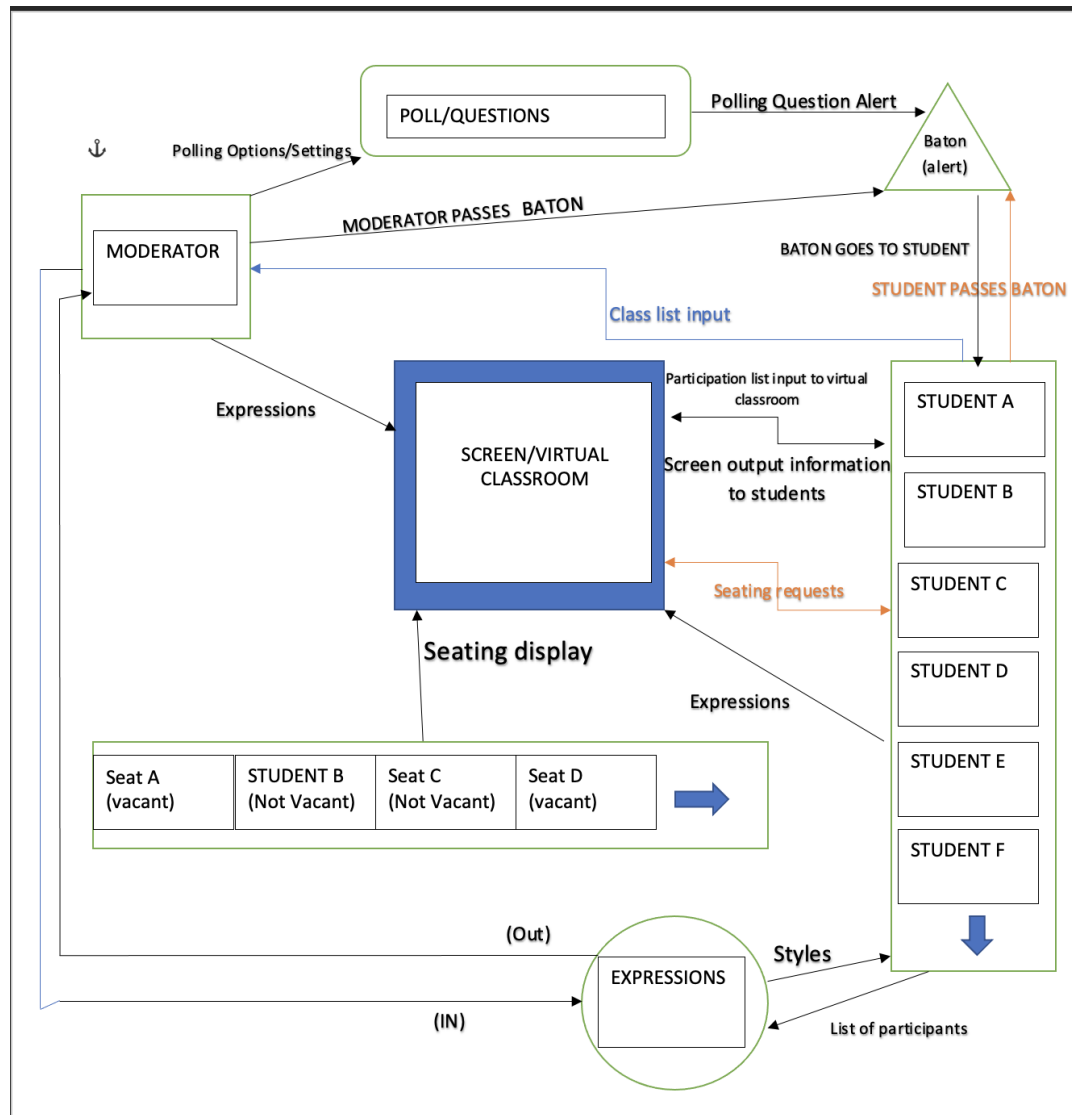Some additional design patterns include but are not limited to:

1.Abstract Factory

2.Decorator

3.Composite

5 Final System Design

The final design would look like in the following diagrams

In Final system design we expect to implement some other features to pass me

For example:

The use of the touch-n-pass pods that will allow students to have a "physical baton" which would look more like a button of the size of an air pods case and would have light, sound, and touch effects.

6 Object Design

When creating the different methods and classes of the system is important to take into account the database previously presented. The classes used in the system are the following:

- Baton class

Includes the following methods:

Pass_Baton()

Request_Baton()

- Emoji Class

Includes the following methods:

Create_emoji()

- Group Class

Includes the following methods:

Create_group()

View_group()

- Quiz Class

Includes the following methods:

Create_quiz()

View_quiz()

IV Project Issues

1 Open Issues

Connecting the PassMe button to the application in order to create a baton like feature. Easily doable in the software (when you do not have the hardware device), but connecting the hardware to the mainframe of the system wirelessly in order to activate it and enable it to receive the necessary signals when the class starts would require some work.

2 Off-the-Shelf Solutions

Although not exactly the task at hand, the PassMe buttons could be made and connected with the class, by getting inspiration from how the "Clickers" are used by students of University of Illinois at Chicago. The wirelessly connecting technology of Clickers can be incorporated into the PassMe buttons in order too make them function the required way.

2a Ready-Made Products

Using a 3D software like Unity 3D, and using already existing IDE's like PyCharm's Professional edition would help in making the development faster by a huge margin.

2b Reusable Components

The PyCharm IDE and the KITE toolkit can be important and helpful additions to the team while coding the software. Other openly available python libraries like Tkinter, PyGui can also be used to work on the initial phases of the project in a faster time frame.

2c Products That Can Be Copied

The database system to store data can be copied from what used by Group 19 in their coding project, in the CityExplorer application. It has the structure and the flexibility to store enough information for an Aplha-Testing in release 1 of our application.

3 New Problems

3a Effects on the Current Environment

The product should not cause any problems with the current environment and the already existing regime that they follow, instead, it would be an interesting addition, making their activities more interactive, just like PassMe promises.

3b Effects on the Installed Systems

Some lower level hardware systems can tend to heat up, and the screen might appear buggy if the user doesn't have a decent enough graphic card installed in their system.

The software would also take a toll on the internet data usage if the user wants to use the best service possible. This would work fine on a 5G coverage, but might require loads of data to be used on a 3G plan.

3c Potential User Problems

PassMe is designed to make the like of users more interactive, and thus, nothing considered in the plan would have adverse effects on the users of the software. However, our team realizes that no software is perfect, and thus, our product won't be either. However, we would take any discouragement and feedback that we get from the users in a positive light, and would try to improve upon those in the future version of the software.

3d Limitations in the Anticipated Implementation Environment That May Inhibit the New Product

Lack of good internet connection might impair the video and the graphic quality of the student-mojis and the video connectivity.

Unavailable hardware (the PassMe button) would prevent the user from getting the full experience of PassMe.

3e Follow-Up Problems

In the future, the team might need to work on the User Interface to make the software experience more smoother for its users.

The team might also need to work on improving the data transfer rate and the amount of data being sent in order to enhance the video features of the application.

4 Migration to the New Product

4a Requirements for Migration to the New Product

Not Applicable

4b Data That Has to Be Modified or Translated for the New System

Not Applicable

5 Risks

The lack of hardware distribution services might play a role in making our product not a very popular choice. So, contracting a bad supplier and distributor is a potential risk. Since the PassMe button is a very important tool in order to best use the software, the possibility of students might not having it will make our product to underperform.

6 Costs

The exact costs will depend on the market rate and the negotiation tactics used by the leaders, however, costs would include securing a supplier and distributor of PassMe buttons. The developers to develop and maintain the software will also add up to the cost. Storing the data, and maintaining security are a crucial part of our product, thus ensuring there factors would require money in order to provide best possible service. These practices would require not only just money, but would also require time and skilled labor. The initial estimate needed for a basic level beta-testing for the product could range from anywhere from One to Two Million dollars. The final project can be released based on the results of the beta tests and the upgrades the team makes after that in order to maintain the quality and uniqueness of PassMe.

7 Waiting Room

An option to make a custom avatar of the student or the teacher instead of having them use their pictures or student-mojis.

Installing a surround sound like system in the PassMe button in order to provide a more "in-class" like experience for the users.

8 Ideas for Solutions

Python language can be used for starters. Using the Pycharm library along with it is a good idea as they are made for each other, and make merging various libraries easier. Some of the libraries which can be used in order to create the experience are PyGUI and Tinkter. Pandas, Numpy and SkLearn can also be used in order to store and process the information in order to improve the experience of the users. Using a coding helper tool called Kite is also a good idea as it provides services like auto-complete, intelligent suggestions, etc. for an efficient coding experience.

9 Project Retrospective

Overall, looking at the times we worked in, a global pandemic, and team members losing their families to it, I think the group has performed really well. We came up with a great idea and were at the core of working to create something worth noting. Initially the group worked great. However, after some time, there were

communication issues within the group and lack of initiative to complete the requirements. This added with the mental health of losing family members caused the grip of some of the members to loosen a bit. However, the members were supportive enough to cover for each other and distribute the share of work in order to reduce the burden on the individual. However, next time, we would like us to work in better mental conditions, and focus more on communication, organization, and command systems within the group to get things done more professionally, and in a more timely manner.

V Glossary

1. student-mojis - the visual representation of character/avatar of meeting participants.

VI References / Bibliography

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