Report

Project Description

In this project we develop a Video chat web app that will support a group to chat among its members simultaneously. A room will be allotted for each group. Admin of that group can add members in his/her group. Communication will be among members of same group.
We will be implementing this using WebRTC API. WebRTC ("Web Real-Time Communication") is a collection of communications protocols and application programming interfaces that enable real-time communication over peer-to-peer connections. This allows web browsers to not only request resources from backend servers, but also real-time information from browsers of other users.
The user interface i.e front end will be implemented in HTML, CSS and Javascript.

Previous Work

Although several implementations of video chat app exists, however this app is solely for learning purpose. We want to learn WebRTC protocols and API. This will also give knowledge of how peer to peer communication works.

Goals

- Peer to peer for single client (Text communication)
- Peer to peer text communication among groups
- Video communication between single peer pair

- Video communication between multiple peers
- GUI modification

Timeline

- Text communication - 15th October
- Video communication between single peer pair - 22nd October
- Video communication between multiple peers - 29th October
- GUI modification - 5th November

GUI modification will depend on how much time is available.
Estimated Completion time - 15th November

Engineering Model

We will use Spiral model. The spiral model is a risk-driven process model generator for software projects. Based on the unique risk patterns of a given project, the spiral model guides a team to adopt elements of one or more process models, such as incremental, waterfall, or evolutionary prototyping. First of all core modules such as text communication will be added. Risks will be analyzed before implementing video communication and then layer by layer addition will be done.

Resources

- Human resources - We are a team of five members.
- Technical resources :
  Javascript for application programming
  HTML, CSS for front end

WebRTC for video streaming
Git as version control

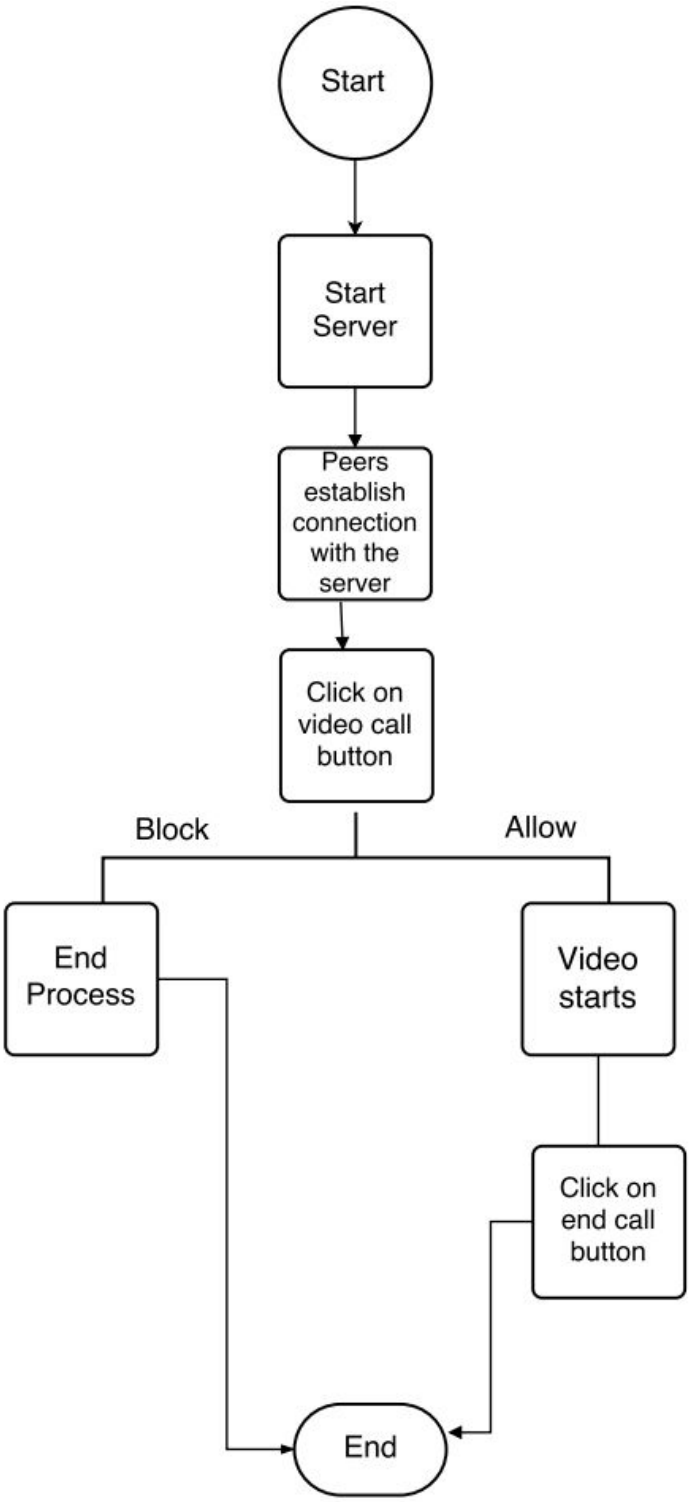
Project Process

- We will present weekly reports in the tutorial class, briefing about the progress, developments and challenges (if any) being faced by us.
- We will maintain different versions of the application to have feel of how things are progressing and changes are being implemented on a regular basis.

Application

Our target audience is mainly students. We hope that this application can be usable for them with ease and can also be used to understand concepts of peer to peer communication and WebRTC.
This app is developed for the learning purpose. We wanted to try our hands on a new technology WebRTC. WebRTC enables real time communication between peers. This technology can be exploited to develop various services such as we implemented video chat application. Our application is a basic usage of this technology. Those who want to have a knack of this can refer our repo.

Design diagram



Functionalities

Functions implemented in server.js

- Handling client connection
- Handling client message

Functions implemented in client.js

- Send client information
- Prepare_call
- Intialiate_call
- Answer_call
- Handle_message_from_server
- Create_and_send_offer
- Create_and_send_answer
- Ice_candidate_handler
- Add_stream_handler
- End_call

Challenges

Since WebRTC is a new technology less tutorials were available till date. Implementing ICE candidate handlers also proved to be a difficult task. Moreover establishing connection in this technology is different from TCP. In TCP we have to send syn and ack to complete a three way handshake whereas here we had to create new offers and set local description and remote description. Session description protocol (SDP) are exchanged among peers. It contains the peer information.

Tools and languages

Languages

- HTML
- NodeJS

Tools

- Sublime Text Editor
- Github

References

1. https://www.youtube.com/watch?v=bJQQgqxQoxI&t=529s
2. https://www.youtube.com/watch?v=p2HzZkd2A40&t=145s
3. https://en.wikipedia.org/wiki/WebRTC

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