Viraj Jayasinghe-26006499

Pencheng Xia-24824887

Assignment 3

Spiking and Analysis of Alternatives

Team 6

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Platforms:

1. Socket IO

A JavaScript library for real-time web application. It has two components: a client -side library that runs in the browser and a server-side library for Node.js. Socket Io can be installed with the npm tool.

Background: Socket.IO primarily uses the Web socket protocol with polling as a fallback option, while providing the same interface. Although it can be used as simply a wrapper for Web Socket, it provides many more features, including broadcasting to multiple sockets, storing data associated with each client, and asynchronous I/O.

Socket IO Main Features :

Socket Io provides the ability for app developers to implement app based on real-time communication. It handles the connection transparently. The programmer will only need to have Socket IO knowledge because itself will automatically upgrade to Web socket if possible.

2.Firebase:

A powerful mobile and web application platform, which helps developer to build their Apps.

Background: Firebase's initial product was a real-time database, which provides an API that allows developers to store and sync data across multiple clients. Over time, it has expanded its product line to become a full suite for app development. The company was acquired by Google in October 2014 and a significant number of new features were featured in May 2016 at Google I/O.

Firebase Main Features :

1. **Real-time Database**:

Real-time Database is a cloud-hosted database. Data is stored as JSON and synchronized to each associated client. Real-time Database allow the most current data to be updated in real-time.

2. **Authentication**:

Firebase Authentication is a service that can authenticate users using only client-side code. It includes a user management system whereby developers can enable user authentication with email and password login stored with Firebase.

3. **Storage**

Firebase Storage is upheld by Google Cloud Storage, a capable, basic, and cost-effective object storage service. This storage feature allows app developers to store and serve their own generated content, such as pictures, sound and videos.

4. More Features:

There are more useful features than the three above. For example, Hosting, Cloud Messaging, Remote Config, Crash Reporting and Notifications. They all offer great help for app developers.

Criteria:

	Johnny-Five/ Socket IO	Johnny-Five/ Firebase
1.Authentication /User security	X	√
2.Efficient Real-time communication	√	√
3.Useful feedback / Crash reporting	X	√
4.Internet dependency	√	X
5.Performance	√	√
6.Mobile Friendly	X	√
7.Easy to code /debug	√	√

1.Authentication /User security:

The socket server will not automagically know about the logged-in user Anyone can join any stream. Developers will have to write their own code for Authentication, which can be very challenging.

Firebase provides authentication for user to log in with their email address and password.

2.Efficient Real-time communication:

Both them provide real-time communication between client and server.

Firebase also allow user to store data to its online real-time database using JSON. Even though Firebase does not use SQL feature, which make it very difficult to migrate the online database from the existing data easily. It is still quite good compare with socket IO.

3.Useful feedback / Crash reporting:

Socket IO offers connection status feedback, which is helpful but also vert limit.

Firebase has a feature called Crashing report. It can help users to create report regarding errors. In addition to that, users can register custom events to help capture the steps which lead to crash.

4.Internet dependency:

Socket IO is independent from the Internet.

For the firebase, the client must be connected to Internet in order to use the services of firebase

5.Performance:

Both socket IO and firebase can meet the need for real-time program.

Socket IO have shorter reacting time, which makes it run faster and more efficient.

On the other hand, Firebase has more convenient features such as real-time database and self-generated content storage.

6.Mobile Friendly

Comparing with Socket IO. Firebase is friendly for mobile app developer. It offers static hosting, user authentication and real-time database, which are difficult to find by using Socket.

7.Easy to code /debug

During the time that we were coding for assignment 1 and 2, we found that socket IO took less time to code than firebase. Because we did have to consider too much about storing or updating date online and connecting client with firebase. On the other hand, it will be easier to debug by using firebase. The crash reports and useful feedbacks from the Firebase were helpful.

Spikes Analysis:

With the johnny5/socket.io platform, we made a basic spike. Here, the server identifies if the motion sensor goes high or low using johnny5 and for each scenario, it sends a message through socket.io. This message is the timestamp we took right before sending the message. On the client side, once it has detected a message, the client will take the data inside. Right after doing this, the client will take its own timestamp and minus it from the one received in the message. We used node.js to put 5 of these time differences into an array to get its average and the results we got stayed at around 1 to 2 milliseconds.

With the other spike we made, johnny5/firebase, we used a similar method. Here, when the motion sensor goes either high or low, the server will take a timestamp and push it to the database as a child. The client listens to any new children entered into the database and as soon as it identifies one, it retrieves the new child. Right after the new child is retrieved, the client takes its own timestamp and gets the difference from the one it retrieved from the database. After repeating this process five times as well, we find that the average time is now around 200 to 250 milliseconds, which is significantly slower than what we managed to get with socket.io.

It is also important to note here that the internet speed of the client as well as the server has a considerable impact on the amount of time it takes to send messages across. However, we found out that since you can send messages to various parts of the firebase database, we can have multiple clients and servers performing bi-directional communications with each other. This is not quite as possible with socket.io as it is operated locally. Also, we can have the client running on a different device and operate away from the server using the internet to communicate with each other.

Recommendation:

Johnny5/Firebase is the option that we select.

The reasons are as follows:

1. More clients and servers can communicate with each other. For instance, we have a child inside the database named “client1”, “client2”, “client3”, which are used as three different communication channels for each client connected to the database. Same can also be done with servers as they push data to the database.
2. Different devices can be supported and the clients and servers can operate in different parts of the world. Since the firebase database can be accessed through the internet, clients and servers merely use it as a “communication adapter” to send and receive relevant data.
3. Even though we managed to prove a significant difference in performance between socket.io (being the faster at communication), this difference can be reduced. For instance, using a better internet connection can cause a considerable improvement.

Overall, Firebase is a powerful tool and platform for Web and/or Mobile app development. The level of communication features it provides when compared to socket.io makes it the better option, regardless of the performance difference.

Reference:

1.The Background for socket IO, *Socket IO*, Retrieved from https://en.wikipedia.org/wiki/Socket.IO

2.The Background for Firebase, *Firebase*, Retrieved from https://en.wikipedia.org/wiki/Firebase