Menu

Build A Real-Time Chat App With VueJS, Vuex & Cloud Firestore

BY LACHLAN MILLER ON OCTOBER 16, 2017 12 COMMENTS

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Last week Google's Firebase platform released a new product, *Cloud Firestore*. Much like the Firebase real-time database, it is a NoSQL-based cloud database that can be used to build real-time applications. It addresses some of the problems Firebase has, like writing complex queries. You can read more about its features here.

In this post, I'll be building a simple real-time chat application called *Firechat* which uses Vue and Vuex, and the new Cloud Firestore. I'll look at how to integrate Firestore into a Vue.js application and some best practices with Vuex. You can get the final source code here on Github.

Installation

Let’s start by scaffolding a new Vue application using the vue-cli. I’ll use the *webpack-simple* template.

```
$ vue init webpack-simple firechat
```

Before going any further, I want to use the spread operator `...` and `async/await`. We will also be using Vuex for state management, and uuid for generating random ids, so let’s install those. We will also need the Firebase module.

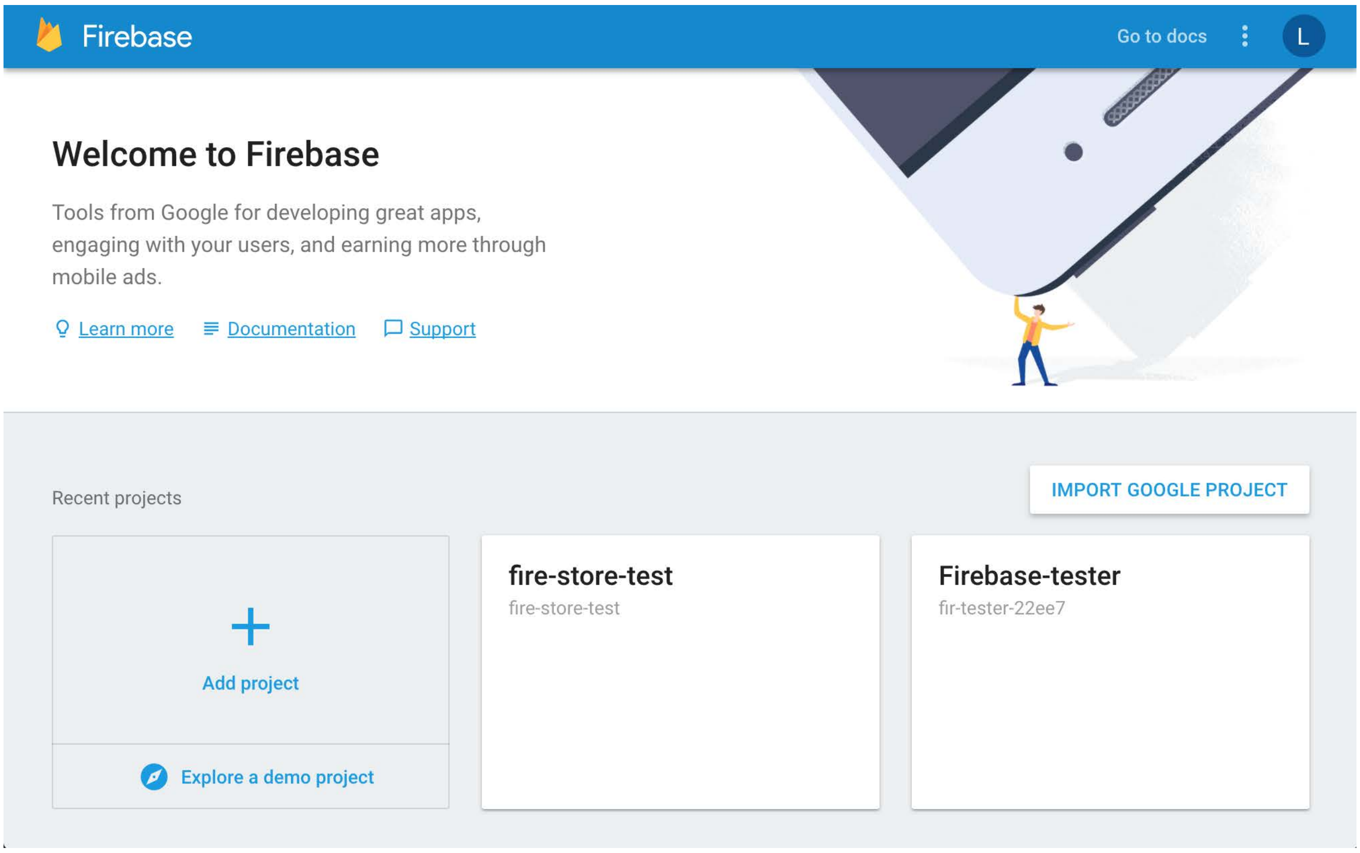
```
$ npm install babel-plugin-transform-async-to-generator babel-plugin-
transform-object-rest-spread Firebase babel-polyfill vuex uuid --save
```

Next, in the project root directory, edit `.babelrc` like so:

```
{
  "presets": [
    ["env", { "modules": false }]
  ],
  "plugins": ["transform-async-to-generator", "transform-object-rest-
spread"]
}
```

Now we can use the spread operator `...` and `await/async`.

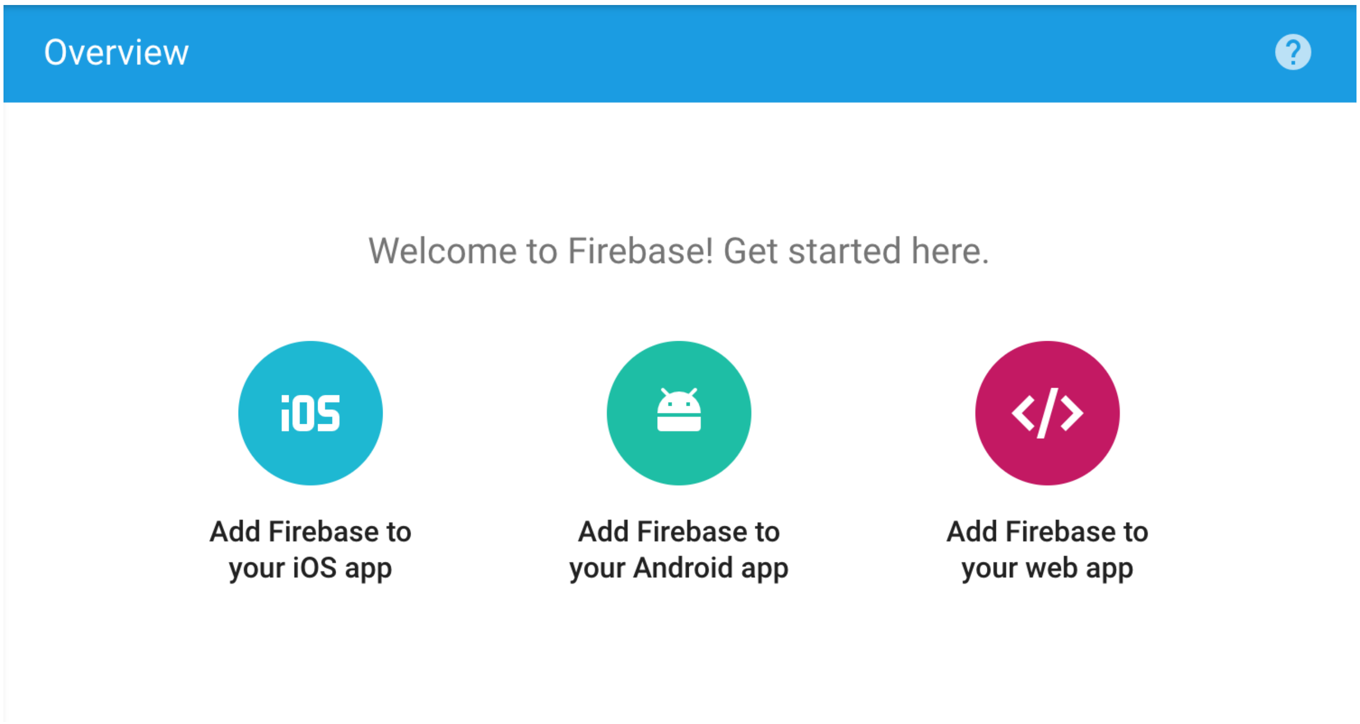
Before going any further, go to Firebase and sign up if you haven’t got an account. Once you do, click “Add Project” and enter a name.



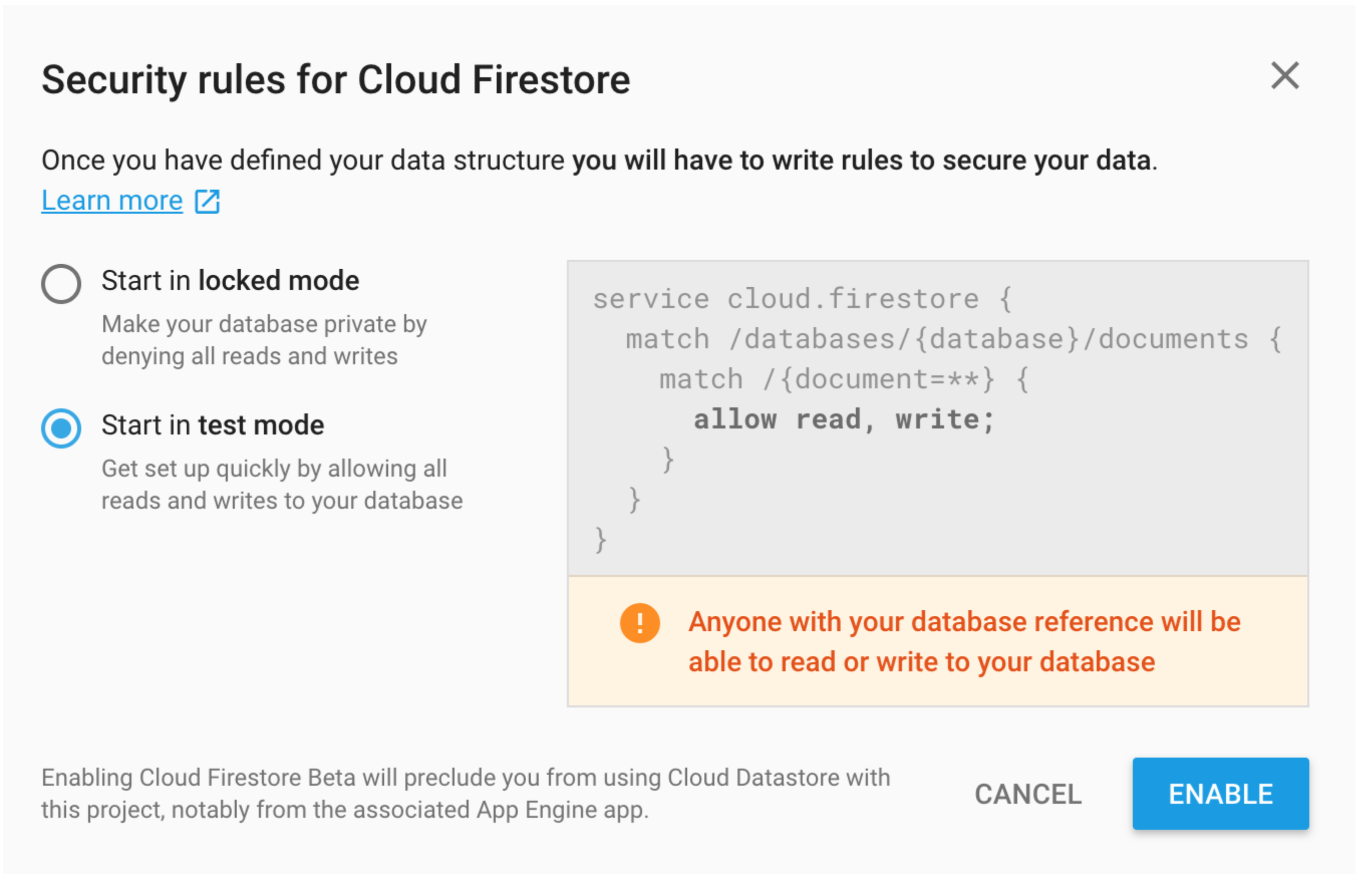
Welcome to Firebase

Tools from Google for developing great apps, engaging with your users, and earning more through mobile ads.

Then click “Add Firebase to your web app”.


Overview
Welcome to Firebase! Get started here.
iOS
Add Firebase to your iOS app
Add Firebase to your Android app
Add Firebase to your web app

Grab the `config` object and create a file called `config.js` under `src` like below. Select “test mode” - that’ll be fine for learning Firestore. It means your database will be public, so don’t share the link on the internet anywhere.



Security rules for Cloud Firestore

Once you have defined your data structure **you will have to write rules to secure your data**.
Learn more

Start in **locked mode**
Make your database private by denying all reads and writes

[✓ Start in **test mode**]
Get set up quickly by allowing all reads and writes to your database

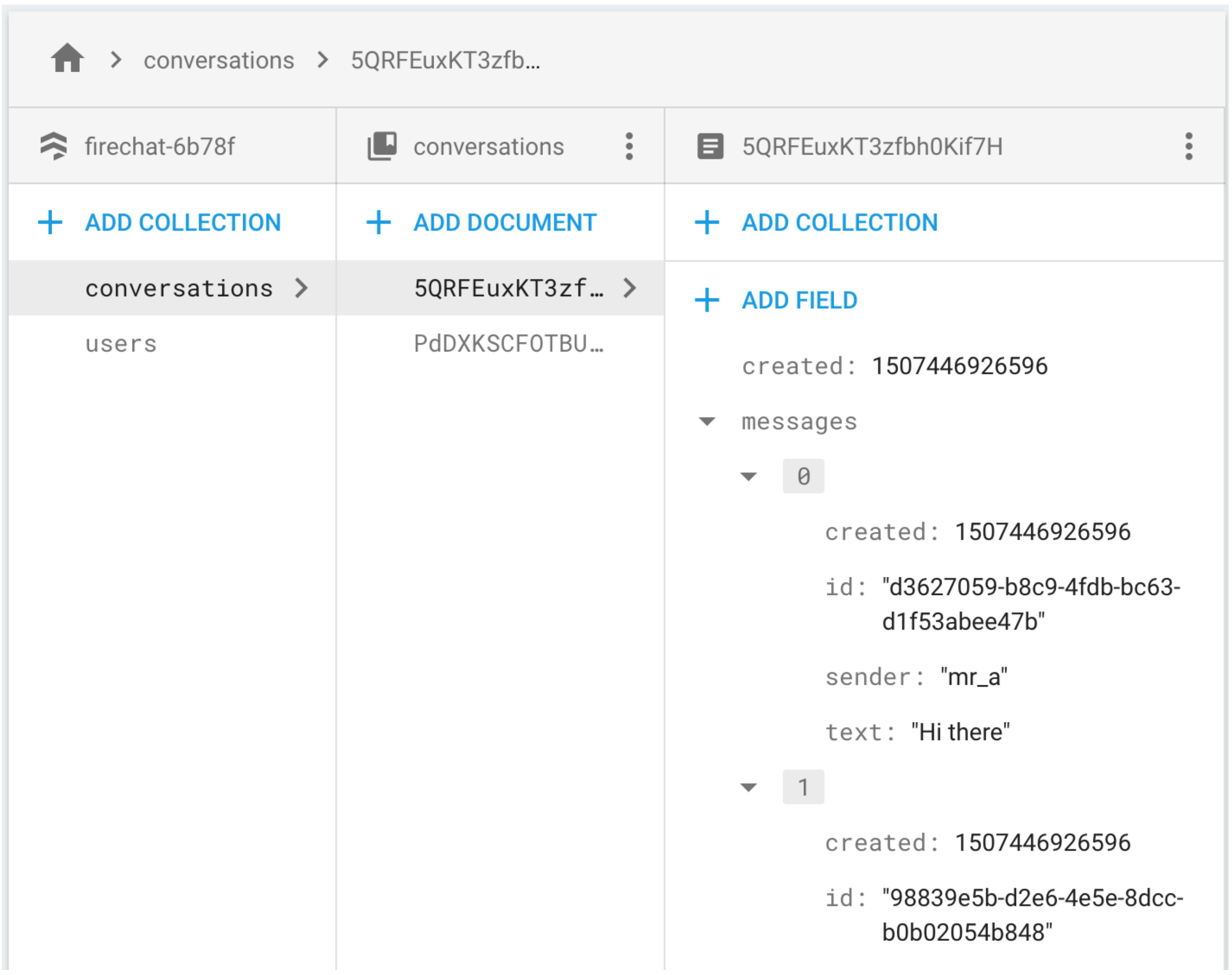
```
service cloud.firestore {
  match /databases/{database}/documents {
    match /{document=**} {
      allow read, write;
    }
  }
}
```

Anyone with your database reference will be able to read or write to your database

Enabling Cloud Firestore Beta will preclude you from using Cloud Datastore with this project, notably from the associated App Engine app.

```
const config = {
  apiKey: "...",
  authDomain: "...",
  databaseURL: "...",
  projectId: "...",
  storageBucket: "",
  messagingSenderId: "..."
};

export default config
```

Head back to Firebase, and under the database tab, click “Try Firestore Beta” and “Start in Test Mode”, which will take you to a UI where you view the database as it changes in real time.



conversations
users

5QRFEuxKT3zf...
PdDXKSCFOTBU...

created: 1507446926596
messages
0
created: 1507446926596
id: "d3627059-b8c9-4fdb-bc63-d1f53abee47b"
sender: "mr_a"
text: "Hi there"
1
created: 1507446926596
id: "98839e5b-d2e6-4e5e-8dcc-b0b02054b848"

Setup Firestore with Vuex

Next, let's set up Vuex and Firestore. Create a folder under `src` called `store`, and inside `index.js`. Enter the following:

```
import Vue from 'vue'
import Vuex from 'vuex'

import 'babel-polyfill'

import Firebase from 'Firebase'
import 'Firebase/firestore'
import config from '../config'

Firebase.initializeApp(config)

Vue.use(Vuex)
  const state = {
  db: Firebase.firestore()
}

export default new Vuex.Store({
  state,
  modules: {}
})
```

Next, head over to `main.js` and import the store, and inject it into the app.

```
import Vue from 'vue'
import App from './App.vue'
import store from './store'

new Vue({
  el: '#app',
  store,
  render: h => h(App)
})
```

Lastly, visit `App.vue`, delete all the default content, add try `console.log` on the database to make sure everything is working.

```
<template>
  <div></div>
</template>

<script>
export default {
name: 'app',
  created () {
    console.log(this.$store.state.db)
  }
}
</script>

<style>
</style>
```

Finally, run the server using `npm run dev`. If you didn't make any mistakes, you should see

`Firestore {__ob__: Observer}` in the console! That means Firestore is configured and working.

Writing Seed Data To Firestore

Let's create some initial data to work with. We can write using the Firestore API method, `add`. Start by creating a component called `Initialize.vue` in `src`. This component will give us an interface to seed the data. The actual creation of data will happen in the Vuex store.

```
<template>
  <div>
    <button @click="init">Initialize app base state</button>
    <button @click="get">Get</button>
  </div>
</template>

<script>
  export default {
    name: 'InitializeData',

    methods: {
      init () {
        this.$store.dispatch('users/seed')
        this.$store.dispatch('conversations/seed')
      },

      get () {
        // todo
      }
    }
  }
</script>

<style>
</style>
```

We also stubbed a `get()` method which will get the data later on.

The application will have two Vuex modules: `conversations.js` and `users.js`. Messages will be saved in an array in `conversations.js`. If the application was to get bigger and more complex, I'd make a module for `messages.js` as well, but it will not be necessary at this stage.

Go ahead and create `conversations.js` and `users.js` inside of `store`.

Users Seed Data

Inside of `users.js`, add the following:

```
const state = {
  all: {},
  currentUser: 'mr_a'
}

const mutations = {
}

const actions = {
  seed ({ rootState }) {
    let userRef = rootState.db.collection('users')

    userRef.doc('mr_a').set({
      firstName: 'Andy',
      lastName: 'Andyson'
    })

    userRef.doc('mr_b').set({
      firstName: 'Ben',
      lastName: 'Benson'
    })

    userRef.doc('mr_c').set({
      firstName: 'Cee',
      lastName: 'Ceeson'
    })
  }
}

export default {
  namespaced: true, state, mutations, actions
}
```

`state` simply declares the state, so Vue can add reactivity for us. `currentUser` will simulate having someone logged in, and used to set the `sender` property on messages.

`db.collection('users')` is part of the Firestore API. It returns a reference to the collection in the Firestore database. If it does not exist, it is created (or will be when you insert a document into it). Read more here: https://firebase.google.com/docs/firestore/data-model.

Firestore provides a `set()` method to add new data. You must provide a unique identifier. In this case, I'm using what would usually be known a username - `mr_a`, `mr_b` and so on. Even if a user was the change their `firstName` or `lastName`, the unique identified would remain the same. In the above snippet, I also set `currentUser` in the state. This will be used later to set a `sender` field when when sending messages. Easy.

Conversations Seed Data

Let's see a bit more of the Firestore API by creating some seed data in `conversations.js`.

```
import Vue from 'vue'
import uuidv4 from 'uuid/v4'

const state = {
  all: {},
  allIds: [],
  allMsgIds: []
}

const mutations = {

}

const actions = {
  seed ({ rootState }) {
    let convoRef = rootState.db.collection('conversations')

    convoRef.add({
      created: Date.now(),
      users: ['mr_a', 'mr_b'],
      messages: [
        { id: uuidv4(), text: 'Hi there', sender: 'mr_a', created:
Date.now() },
        { id: uuidv4(), text: 'Hi to you too!', sender: 'mr_b', created:
Date.now() }
      ]
    })

    convoRef.add({
      created: Date.now(),
      users: ['mr_a', 'mr_c'],
      messages: []
    })
  }
}

export default { namespaced: true, state, mutations, actions }
```

A bit more going on here than the `users` store. `all` will hold all the conversations in the application. `allIds` will be an array of `conversation.id`. Lastly, `allMsgIds` will be an array containing all the `conversation.message` ids. We will use `allMsgIds` to decide if a message is new or not later on when adding new messages.

There are actually two ways to add data to a collection in Firestore, `set()` and `add()`. When using `set()` you must specify an id for the document. You could make one using something like uuid (which we import at the top of the store). In `users`, we manually specified one.

Alternatively, we can have Firestore generate a random id for us using `add()`, which is what is happening above. The messages are nested in the conversation document, however, are Firestore cannot generate an id for us, so we created one using the `uuid` module. That's it for setting the seed data up.

Inject the modules to the Vuex store

Now we have some seed data ready to go, head back to `index.js` and import the `conversations` and `users` modules, and add them the Vuex.Store constructor. Previous code has been omitted for brevity.

```
  import Vue from 'vue'
  import Vuex from 'vuex'
  ...
  import users from './users'
  import conversations from './conversations'

  ...
```

```
export default new Vuex.Store({
  state,
  modules: {
    users,
    conversations
  }
})
```

Modify **App.vue** to import and use the **Initialize.vue** component:

```
<template>
  <div>
    <Initialize />
  </div>
</template>

<script>
import Initialize from './Initialize.vue'

export default {
  name: 'app',

  created () {
    console.log(this.$store.state.db)
  },

  components: {
    Initialize
  }
}
</script>

<style>
</style>
```

Now try clicking *Initialize app base state*. The data should be written to Firestore (you may need to refresh the Firestore page to see the new collections).

Fetching Data From Firestore

The next thing to do is display the Firestore data in the Vue app. Head to `conversations.js` and add a `get()` method. We will use the ES7 `async/await` syntax.

```
actions: {
  // seed () ...
  async get ({ commit, rootState }) {
    let convoRef = rootState.db.collection('conversations')
    let convos = await convoRef.get()

    convos.forEach(conversation => commit('SET_CONVERSATION', {
conversation }))
  }
```

Again, we get a reference to the collection using `db.colletion`. Calling `get()` on the collection returns a promise. I don't check for failure here, but you can do so with a `try/catch` loop in a real application.

For each conversation, we then `commit` a mutation which we will make next, with conversation as the payload.

Let's create the mutation now:

```
const mutations = {
  SET_CONVERSATION (state, { conversation }) {
    const data = conversation.data()
    state.all = {
      ...state.all,
      [conversation.id]: { users: data.users, created: data.created,
messages: [] }
    }
    state.allIds.push(conversation.id)
  }
}
```

Some interesting stuff here. Firstly, to access the data in a Firestore document, you need to call `data()` on the object. If you simply do `console.log(conversation)`, you won't see the data. `conversation.id` contains the unique id Firestore made for us.

Note that doing `state.app[conversation.id] = conversation` does not work! It will add the properties to the store, but they will NOT have Vue reactivity, which would prevent us from adding new message down the line. See https://vuejs.org/v2/guide/reactivity.html for more details.

Note that we also do not add the messages (although when we call `data()` we do have access to them). We'll see why later on. We also save the `conversation.id` in the `allIds` array.

Let's do the same for `users.js`. We will also set `mr_b` as the `currentUser`.

```
const state = {
  all: {},
  currentUser: 'mr_b'
}

const mutations = {
  SET_USER (state, { user }) {
    state.all = {...state.all, [user.id]: user.data() }
  }
}

const actions = {
  seed ({ rootState }) {
    let userRef = rootState.db.collection('users')

    userRef.doc('mr_a').set({
      firstName: 'Andy',
      lastName: 'Andyson'
    })

    userRef.doc('mr_b').set({
      firstName: 'Ben',
      lastName: 'Benson'
    })

    userRef.doc('mr_c').set({
      firstName: 'Cee',
      lastName: 'Ceeson'
    })
  },

  async get ({ commit, rootState }) {
    let userRef = rootState.db.collection('users')
    let users = await userRef.get()
    users.forEach(user => commit('SET_USER', { user }))
  }
}

export default {
  namespaced: true, state, mutations, actions
}
```

That’s it for access the data. Time to create some components to display it.

Creating Components to Display Firestore Data

Now create `ConversationContainer.vue` and `Message.vue` inside `src`, and enter the following. We will start with `Message.vue`.

```
<template>
  <div class="message-container">
    <div :class="getPosition">
      {{ message.text }}
    </div>
  </div>
</template>

<script>
  export default {
    name: 'Message',

    props: {
      message: {
        type: Object,
        required: true
      }
    },

    computed: {
      getPosition () {
        if (this.message.sender === this.$store.state.users.currentUser)
{
          return 'my message'
        } else {
          return 'message'
        }
      }
    }
  }
</script>

<style scoped>
.my.message {
  text-align: right;
}

.message-container {
  border: 1px solid silver;
}
</style>
```

Nothing exciting here. A simple check to decide if the message was sent by the current user and to position it accordingly. Let's move on to `ConversationContainer.vue`.

```
  <template>
    <div>
      Conversation ID: {{ id }}
      <hr>
      <Message
        v-for="message in conversation.messages"
        :message="message"
        :key="message.created"
      />
    </div>
  </template>

  <script>
    import Message from './Message.vue'
    import { mapState } from 'vuex'

    export default {
      name: 'ConversationContainer',

      props: {
        conversation: {
          type: Object,
          required: true
        },
        id: {
```

```
        type: String,
        required: true
      }
    },

    created () {
      // todo: LOAD MESSAGES
    },

    components: {
      Message
    }
  }
</script>

<style scoped>
</style>
```

Again, nothing special. Later on in `created()` we will load all the messages, and listen for new ones. This component will receive a `conversations` as a prop, which comes from `$store.state.conversations`.

Now import `ConversationContainer.vue` in `App.vue`. Note this is the final implementation for `App.vue`.

```
<template>
  <div>
    <Initialize />
    <ConversationContainer
      v-for="id in convoIds"
      :conversation="conversations[id]"
      :id="id"
      :key="id"
    />
  </div>
</template>

<script>
import Initialize from './Initialize.vue'
import ConversationContainer from './ConversationContainer.vue'

import { mapState } from 'vuex'
```

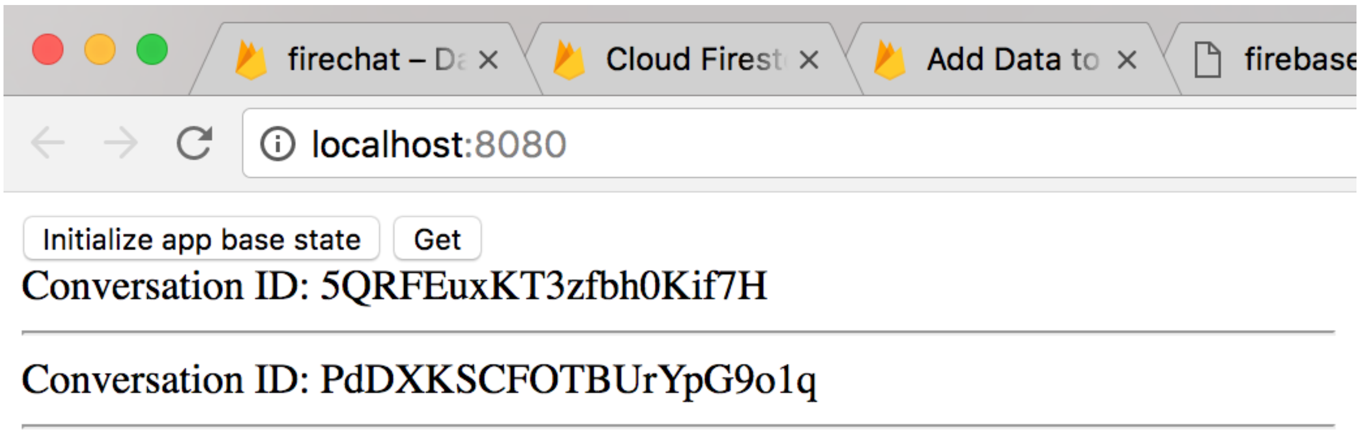
```
export default {
  name: 'app',
  components: {
    Initialize,
    ConversationContainer
  },

  computed: {
    ...mapState({
      conversations: state => state.conversations.all,
      convoIds: state => state.conversations.allIds
    })
  },
}
</script>

<style>
</style>
```

Pretty straightforward - we loop `allIds`, and pass each conversation as a prop to the `ConversationContainer.vue`. We can use the `id` from Firestore as a `:key` for the `v-for` loop as a bonus. The Vuex `mapState` helper function makes it easy to access the state.

Lastly, update `Initialize.vue` to actually fetch the data (we stubbed `get()` out earlier, remember?)

```
methods: {
  // init () ...
  get () {
    this.$store.dispatch('users/get')
    this.$store.dispatch('conversations/get')
  }
```

If everything went well, you should be able to click the “GET” button and see the following:



Conversation ID: 5QRFEuxKT3zfbh0Kif7H

Conversation ID: PdDXKSCFOTBUrYpG9o1q

Fetching Messages in Real Time

Finally, the bit we've all been waiting for - real-time messaging. In `ConversationContainer.vue`, update `create()` to look like the following:

```
created () {

this.$store.state.db.collection('conversations').doc(this.id).onSnapshot
(convo => {
    let source = convo.metadata.hasPendingWrites ? 'Local' : 'Server'

    console.log(`Source ${source}`)

    // TODO: add messages to store
  })
}
```

In Firestore, you can listen to a document using the `onSnapshot()` method. More here: https://Firebase.google.com/docs/firestore/query-data/listen.

Firstly, refresh the Vue application and hit *get* to query Firestore for the conversations. Check the console. You should see `Source: Server` printed twice. `onSnapshot()` triggers immediately, returning the current state of the document. It also will trigger every time the document changes.

This is why we didn't populate the messages in the `conversations.js` - module - we want to fetch the conversation once initially, to get the ID and members, but constantly be watching for new messages. We will take advantage of the initial `onSnapshot()` to get the current state of the conversation, specifically the messages, and then update anytime a new message is created.

Notice the line `let source = convo.metadata.hasPendingWrites ? 'Local' : 'Server'`. This is due to a feature called latency compensation. Basicially, when you write data, all clients listening to the document will receive a notification, before the data is even sent to Firestore. You could use perhaps use this to show a “member is typing…” notification. If `hasPendingWrites` is true, the data has not been written yet, and if it’s false, it has.

Now, we need to add the messages to the store. Update `created()` like so:

```
created () {

this.$store.state.db.collection('conversations').doc(this.id).onSnapshot
(convo => {
      let source = convo.metadata.hasPendingWrites ? 'Local' : 'Server'

    console.log(`Source: ${source}`)

      if (convo && convo.data()) {
        convo.data().messages.forEach(message =>
this.$store.commit('conversations/ADD_MESSAGE', {
            conversationId: this.id, message })
        )
      }
  })
}
```

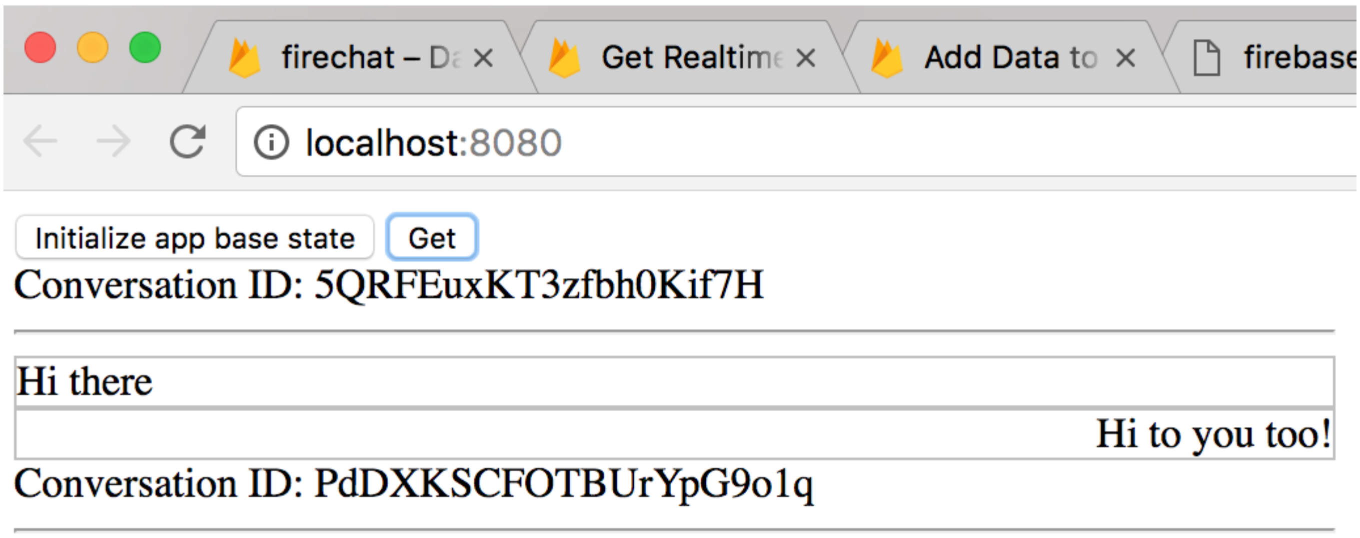
You access the data in the document returned from `onSnapshot()` using the `data()` method. Let’s now write the mutation to add the messages in `conversations.js`.

```
const mutations = {
  // SET_CONVERSATION ...

  ADD_MESSAGE (state, { conversationId, message }) {
    if (!state.allMsgIds.includes(message.id)) {
      state.all[conversationId].messages.push(message)
      state.allMsgIds.push(message.id)
    }
```

```
      }
    }
```

`onSnapshot()` returns the *entire* conversation, including the existing messages. By checking if `allMsgIds` includes the `message.id`, and `push`ing it as such, we can ensure only new message are added to the conversation. Vue's reactivity will automatically update the UI for us.

That should be enough to display the messages! Try refreshing, grabbing the data and you should see something like this.



Conversation ID: 5QRFEuxKT3zfbh0Kif7H

Hi there

Hi to you too!

Conversation ID: PdDXKSCFOTBUrYpG9o1q

Sending A Message In Real Time

Lastly, let's send a message in real-time. Update `ConversationContainer.vue`:

```
<template>
<div>
  Conversation ID: {{ id }}
  <hr>
  <Message
    v-for="message in conversation.messages"
    :message="message"
    :key="message.created"
  />
  <br />
  <input v-model="newMessageText" @keyup.enter="send" placeholder="Type
something..." />
</div>
</template>
```

```
<script>
import Message from './Message.vue'
import { mapState } from 'vuex'

export default {
  name: 'ConversationContainer',

  data () {
    return {
      newMessageText: ''
    }
  },

  props: {
    // ...
  },

  created () {
    // ...
  },

  methods: {
    send () {
      this.$store.dispatch('conversations/sendMessage', {
        text: this.newMessageText,
        created: Date.now(),
        conversationId: this.id,
        sender: this.$store.state.users.currentUser
      })
    }
  },

  components: {
    Message
  }
}
</script>
```

Fairly straightforward. Using `v-model`, we bind to an `<input>`, and on `keyup.enter` send the message, passing the `conversationId` to the `commit`.

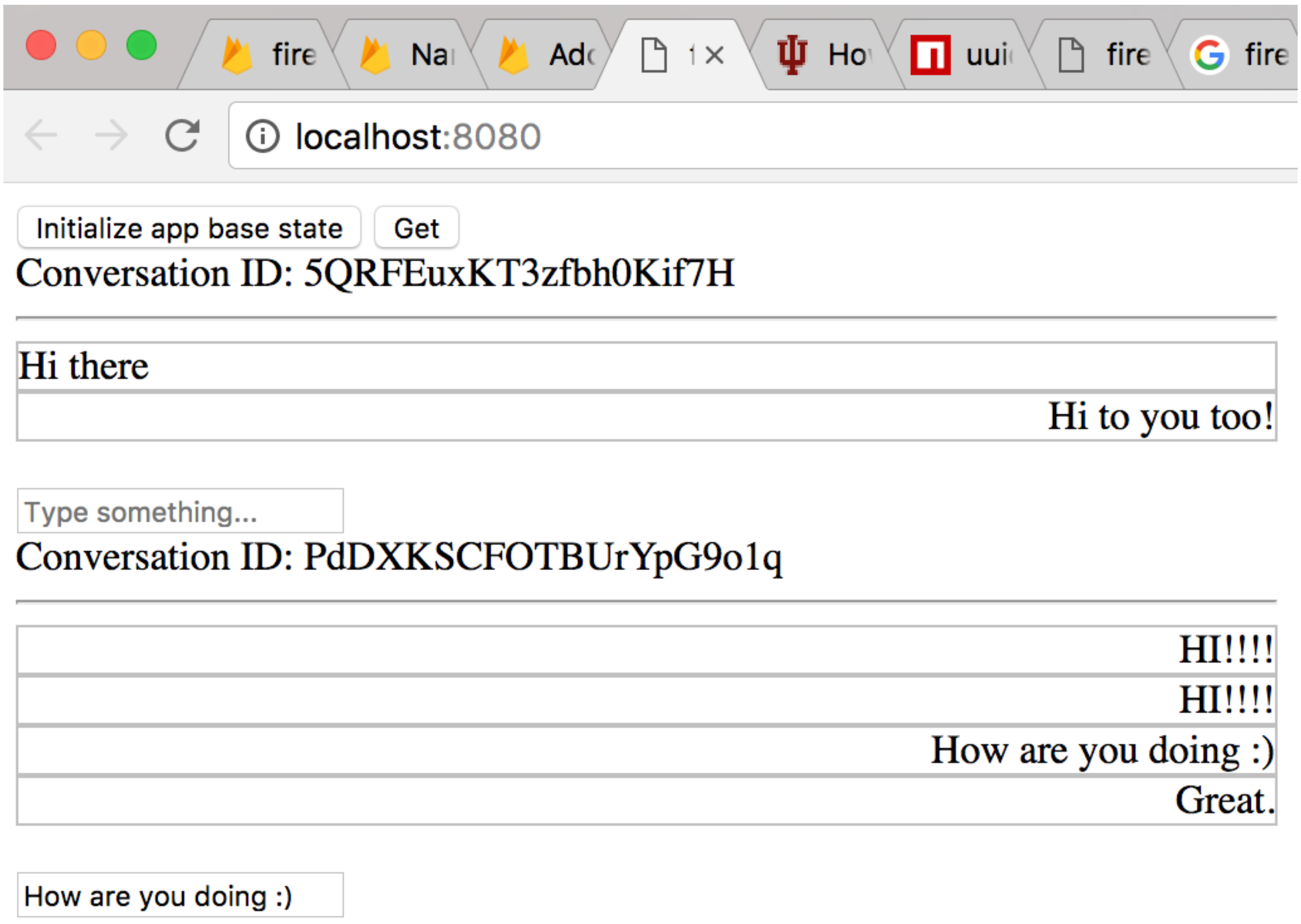
Header over to `conversations.js` and add the following action:

```
actions: {
  // get ()
  // seed ()
  sendMessage ({ commit, rootState }, { text, created, sender,
conversationId }) {
    const convoRef =
rootState.db.collection('conversations').doc(conversationId)

    convoRef.update({
      messages: [...state.all[conversationId].messages, { id: uuidv4(),
created, sender, text }]
    })
    .then(res => console.log('Message sent.'))
    .catch(err => console.log('Error', err))
  }
}
```

Firestore documents are updated using `update()`, which allows you to update certain fields, without touching the others. Read more here: https://firebase.google.com/docs/firestore/manage-data/update-data.

We simply update the `messages` property, with all the existing ones, plus the newly sent message. When the Firestore document is updated, `onSnapshot()` triggers again and adds the message to the conversation.

This should be enough to get the application working real-time! Try opening another browser and send some messages - they should be received real-time in any other clients.



Conversation ID: 5QRFEuxKT3zfbh0Kif7H

Hi there

Hi to you too!

Type something...

Conversation ID: PdDXKSCFOTBUrYpG9o1q

HI!!!!

HI!!!!

How are you doing :)

Great.

How are you doing :)

Conclusion and Improvements

Firestore is very easy to get started with, and extremely powerful. Some improvements to this application include:

- *Only sending and fetching new messages*. At this point, the entire conversation is sent and received. I'm not sure how to do this yet using Firestore. Likely some kind of `Array.push` method exists - let me know if you have a good technique for this!
- *Deleting or editing messages*. This would not work in the current application since when adding messages, we check by id - to allow for editing, you would need to check for the id in `allMsgIds`, and if the `text` was different.
- *Creating new conversations*. At the moment only two conversations exist, the ones created by `seed()`. It would be a good exercise to extend the application to allow for this.
- *Auth*. Firebase also provides authentication, that you could use with an application like this.

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Lachlan is a full stack developer with a strong interest in the modern Javascript stack. He currently resides in Tokyo, Japan.

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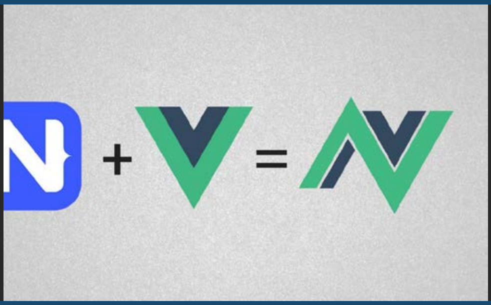

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