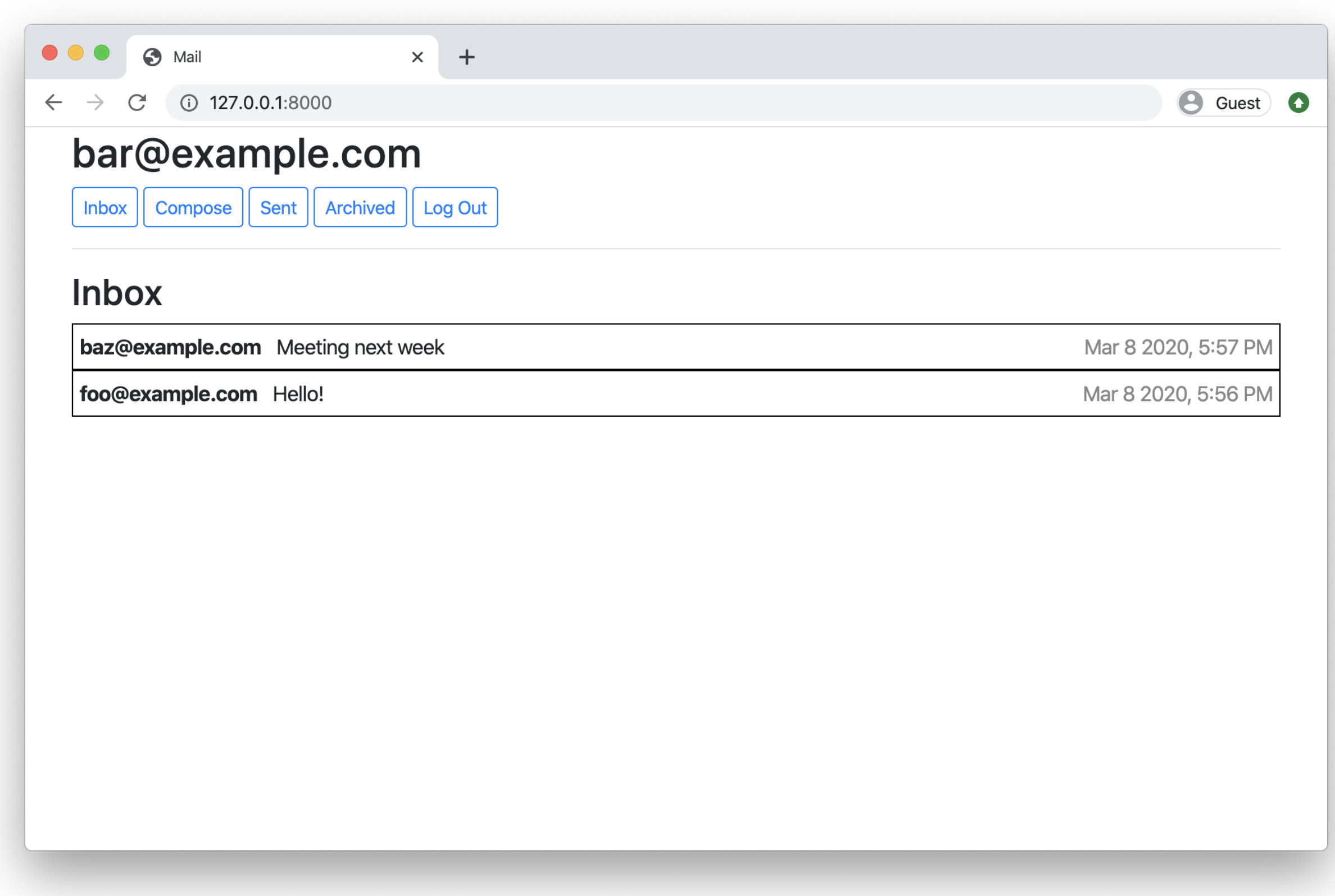
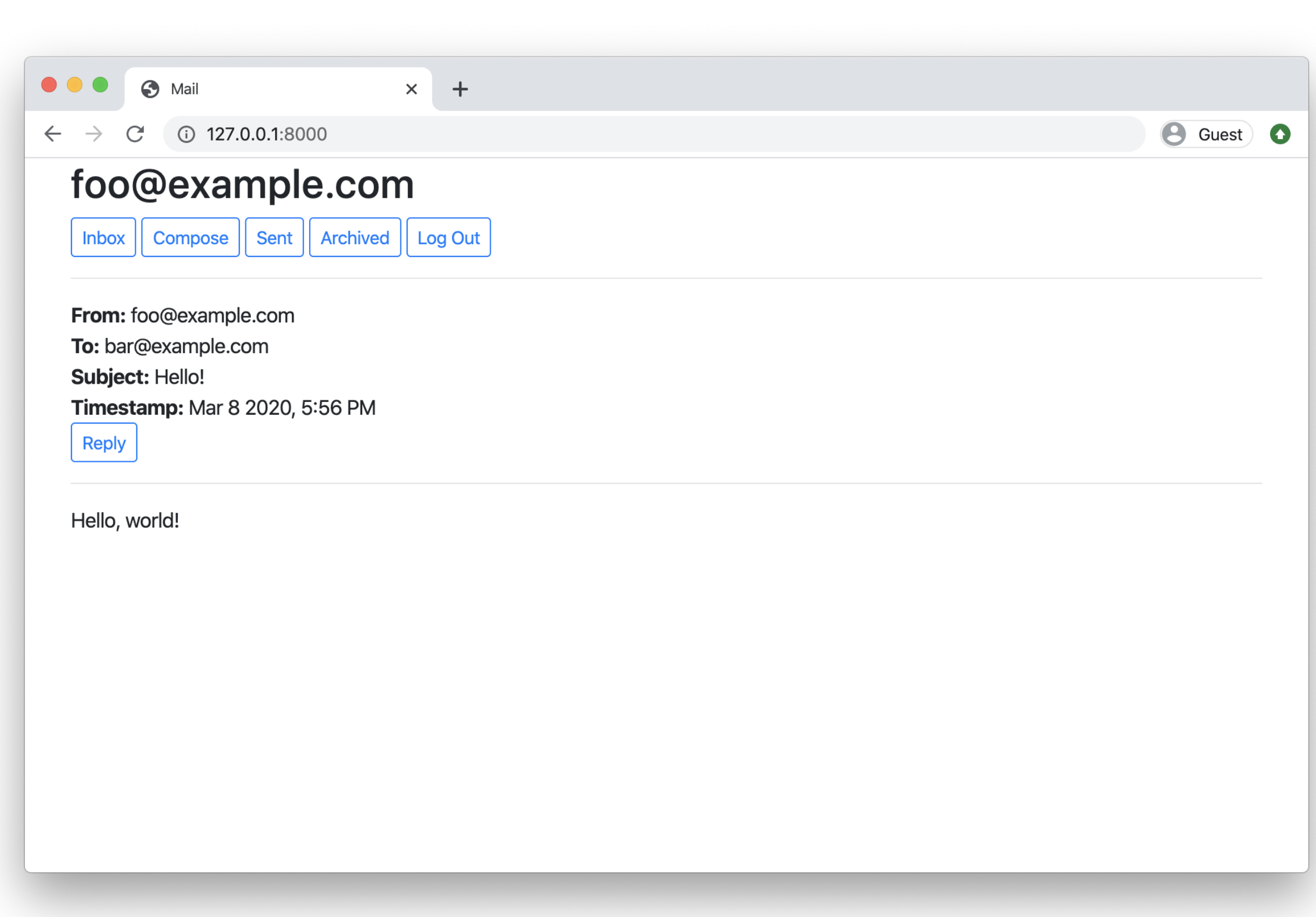
Mail

Design a front-end for an email client that makes API calls to send and receive emails.





Getting Started

1. Download the distribution code from https://cdn.cs50.net/web/2020/spring/projects/3/mail.zip and unzip it.
2. In your terminal, `cd` into the `project3` directory.
3. Run `python manage.py makemigrations mail` to make migrations for the `mail` app.
4. Run `python manage.py migrate` to apply migrations to your database.

Understanding

In the distribution code is a Django project called `project3` that contains a single app called `mail`.

First, after making and applying migrations for the project, run `python manage.py runserver` to start the web server. Open the web server in your browser, and use the "Register" link to register for a new account. The emails you'll be sending and receiving in this project will be entirely stored in your database (they won't actually be sent to real email servers), so you're welcome to choose any email address (e.g. `foo@example.com`) and password you'd like for this project: credentials need not be valid credentials for actual email addresses.

Once you're signed in, you should see yourself taken to the Inbox page of the mail client, though this page is mostly blank (for now). Click the buttons to navigate to your Sent and Archived mailboxes, and notice how those, too, are currently blank. Click the "Compose" button, and you'll be taken to a form that will let you compose a new email. Each time you click a button, though, you're not being taken to a new route or making a new web request: instead, this entire application is just a single page, with JavaScript used to control the user interface. Let's now take a closer look at the distribution code to see how that works.

Take a look at `mail/urls.py` and notice that the default route loads an `index` function in `views.py`. So let's up `views.py` and look at the `index` function. Notice that, as long as the user is signed in, this function renders the `mail/inbox.html` template. Let's look at that template, stored at `mail/templates/mail/inbox.html`. You'll notice that in the body of the page, the user's email address is first displayed in an `h2` element. After that, the page has a sequence of buttons for navigating between various pages of the app. Below that, notice that this page has two main sections, each defined by a `div` element. The first (with an `id` of `emails-view`) contains the content of an email mailbox (initially empty). The second (with an `id` of `compose-view`) contains a form where the user can compose a new email. The buttons along the top, then, need to selectively show and hide these views: the compose button, for example, should hide the `emails-view` and show the `compose-view`; the inbox button, meanwhile, should hide the `compose-view` and show the `emails-view`.

How do they do that? Notice at the bottom of `inbox.html`, the JavaScript file `mail/inbox.js` is included. Open that file, stored at `mail/static/mail/inbox.js`, and take a look. Notice that when the DOM content of the page has been loaded, we attach event listeners to each of the buttons. When the `inbox` button is clicked, for example, we call the `load_mailbox` function with the argument `'inbox'`; when the `compose` button is clicked, meanwhile, we call the `compose_email` function. What do these functions do? The `compose_email` function first hides the `emails-view` (by setting its `style.display` property to `none`) and shows the `compose-view` (by setting its `style.display` property to `block`). After that, the function takes all of the form input fields (where the user might type in a recipient email address, subject line, and email body) and sets their value to the empty string `''` to clear them out. This means that every time you click the "Compose" button, you should be presented with a blank email form: you can test this by typing values into form, switching the view to the Inbox, and then switching back to the Compose view.

Meanwhile, the `load_mailbox` function first shows the `emails-view` and hides the `compose-view`. The `load_mailbox` function also takes an argument, which will be the name of the mailbox that the user is trying to view. For this project, you'll design an email client with three mailboxes: an `inbox`, a `sent` mailbox of all sent mail, and an `archive` of emails that were once in the inbox but have since been archived. The argument to `load_mailbox`, then, will be one of those three values, and the `load_mailbox` function displays the name of the selected mailbox by updating the `innerHTML` of the `emails-view` (after capitalizing the first character). This is why, when you choose a mailbox name in the browser, you see the name of that mailbox (capitalized) appear in the DOM: the `load_mailbox` function is updating the `emails-view` to include the appropriate text.

Of course, this application is incomplete. All of the mailboxes simply show the name of the mailbox (Inbox, Sent, Archive) but don't actually show any emails yet. There's no view yet to actually see the contents of any email. And the compose form will let you type in the contents of an email, but the button to send the email doesn't actually do anything. That's where you come in!

API

You'll get mail, send mail, and update emails by using this application's API. We've written the entire API for you (and documented it below), so that you can use it in your JavaScript code. (In fact, note that we have written **all** of the Python code for you for this project. You should be able to complete this project by just writing HTML and JavaScript).

This application supports the following API routes:

`GET /emails/<str:mailbox>`

Sending a `GET` request to `/emails/<mailbox>` where `<mailbox>` is either `inbox`, `sent`, or `archive` will return back to you (in JSON form) a list of all emails in that mailbox, in reverse chronological order. For example, if you send a `GET` request to `/emails/inbox`, you might get a JSON response like the below (representing two emails):

```
[
    {
        "id": 100,
        "sender": "foo@example.com",
        "recipients": ["bar@example.com"],
        "subject": "Hello!",
        "body": "Hello, world!",
        "timestamp": "Jan 2 2020, 12:00 AM",
        "read": false,
        "archived": false
    },
    {
        "id": 95,
        "sender": "baz@example.com",
        "recipients": ["bar@example.com"],
        "subject": "Meeting Tomorrow",
        "body": "What time are we meeting?",
        "timestamp": "Jan 1 2020, 12:00 AM",
        "read": true,
        "archived": false
    }
]
```

Notice that each email specifies its `id` (a unique identifier), a `sender` email address, an array of `recipients`, a string for `subject`, `body`, and `timestamp`, as well as two boolean values indicating whether the email has been `read` and whether the email has been `archived`.

How would you get access to such values in JavaScript? Recall that in JavaScript, you can use `fetch` to make a web request. Therefore, the following JavaScript code

```
fetch('/emails/inbox')
.then(response => response.json())
.then(emails => {
    // Print emails
    console.log(emails);

    // ... do something else with emails ...
});
```

would make a `GET` request to `/emails/inbox`, convert the resulting response into JSON, and then provide to you the array of emails inside of the variable `emails`. You can print that value out to the browser's console using `console.log` (if you don't have any emails in your inbox, this will be an empty array), or do something else with that array.

Note also that if you request an invalid mailbox (anything other than `inbox`, `sent`, or `archive`), you'll instead get back the JSON response `{"error": "Invalid mailbox."}`.

`GET /emails/<int:email_id>`

Sending a `GET` request to `/emails/email_id` where `email_id` is an integer id for an email will return a JSON representation of the email, like the below:

```
{
        "id": 100,
        "sender": "foo@example.com",
        "recipients": ["bar@example.com"],
        "subject": "Hello!",
        "body": "Hello, world!",
        "timestamp": "Jan 2 2020, 12:00 AM",
        "read": false,
        "archived": false
}
```

Note that if the email doesn't exist, or if the user does not have access to the email, the route instead return a 404 Not Found error with a JSON response of `{"error": "Email not found."}`.

To get email number 100, for example, you might write JavaScript code like

```
fetch('/emails/100')
.then(response => response.json())
.then(email => {
    // Print email
    console.log(email);

    // ... do something else with email ...
});
```

`POST /emails`

So far, we've seen how to get emails: either all of the emails in a mailbox, or just a single email. To send an email, you can send a `POST` request to the `/emails` route. The route requires three pieces of data to be submitted: a `recipients` value (a comma-separated string of all users to send an email to), a `subject` string, and a `body` string. For example, you could write JavaScript code like

```
fetch('/emails', {
  method: 'POST',
  body: JSON.stringify({
      recipients: 'baz@example.com',
      subject: 'Meeting time',
      body: 'How about we meet tomorrow at 3pm?'
  })
})
.then(response => response.json())
.then(result => {
    // Print result
    console.log(result);
});
```

If the email is sent successfully, the route will respond with a 201 status code and a JSON response of `{"message": "Email sent successfully."}`.

Note that there must be at least one email recipient: if one isn't provided, the route will instead respond with a 400 status code and a JSON response of `{"error": "At least one recipient required."}`. All recipients must also be valid users who have registered on this particular web application: if you try to send an email to `baz@example.com` but there is no user with that email address, you'll get a JSON response of `{"error": "User with email baz@example.com does not exist."}`.

`PUT /emails/<int:email_id>`

The final route that you'll need is the ability to mark an email as read/unread or as archived/unarchived. To do so, send a `PUT` request (instead of a `GET`) request to `/emails/<email_id>` where `email_id` is the id of the email you're trying to modify. For example, JavaScript code like

```
fetch('/emails/100', {
  method: 'PUT',
  body: JSON.stringify({
      archived: true
  })
})
```

would mark email number 100 as archived. The body of the `PUT` request could also be `{archived: false}` to unarchive the message, and likewise could be either `{read: true}` or `read: false}` to mark the email as read or unread, respectively.

Using these four API routes (getting all emails in a mailbox, getting a single email, sending an email, and updating an existing email), you should have all the tools you now need to complete this project!

Specification

Using JavaScript, HTML, and CSS, complete the implementation of your single-page-app email client. You must fulfill the following requirements:

- **Send Mail**: When a user submits the email composition form, add JavaScript code to actually send the email.
  - You'll likely want to make a `POST` request to `/emails`, passing in values for `recipients`, `subject`, and `body`.
  - Once the email has been sent, load the user's sent mailbox.
- **Mailbox**: When a user visits their Inbox, Sent mailbox, or Archive, load the appropriate mailbox.
  - You'll likely want to make a `GET` request to `/emails/<mailbox>` to request the emails for a particular mailbox.
  - When a mailbox is visited, the application should first query the API for the latest emails in that mailbox.
  - When a mailbox is visited, the name of the mailbox should appear at the top of the page (this part is done for you).
  - Each email should then be rendered in its own box (e.g. as a `<div>` with a border) that displays who the email is from, what the subject line is, and the timestamp of the email.
  - If the email is unread, it should appear with a white background. If the email has been read, it should appear with a gray background.
- **View Email**: When a user clicks on an email, the user should be taken to a view where they see the content of that email.
  - You'll likely want to make a `GET` request to `/emails/<email_id>` to request the email.
  - Your application should show the email's sender, recipients, subject, timestamp, and body.
  - You'll likely want to add an additional `div` to `inbox.html` (in addition to `emails-view` and `compose-view`) for displaying the email. Be sure to update your code to hide and show the right views when navigation options are clicked.
  - See the hint in the Hints section about how to add an event listener to an HTML element that you've added to the DOM.
  - Once the email has been clicked on, you should mark the email as read. Recall that you can send a `PUT` request to `/emails/<email_id>` to update whether an email is read or not.
- **Archive and Unarchive**: Allow users to archive and unarchive emails that they have received.
  - When viewing an Inbox email, the user should be presented with a button that lets them archive the email. When viewing an Archive email, the user should be presented with a button that lets them unarchive the email. This requirement does not apply to emails in the Sent mailbox.
  - Recall that you can send a `PUT` request to `/emails/<email_id>` to mark an email as archived or unarchived.
  - Once an email has been archived or unarchived, load the user's inbox.
- **Reply**: Allow users to reply to an email.
  - When viewing an email, the user should be presented with a "Reply" button that lets them reply to the email.
  - When the user clicks the "Reply" button, they should be taken to the email composition form.
  - Pre-fill the composition form with the `recipient` field set to whoever sent the original email.
  - Pre-fill the `subject` line. If the original email had a subject line of `foo`, the new subject line should be `Re: foo`. (If the subject line already begins with `Re: `, no need to add it again.)
  - Pre-fill the `body` of the email with a line like `"On Jan 1 2020, 12:00 AM foo@example.com wrote:"` followed by the original text of the email.

Hints

- To create an HTML element and add an event handler to it, you can use JavaScript code like the below:

```
const element = document.createElement('div');
element.innerHTML = 'This is the content of the div.';
element.addEventListener('click', function() {
    console.log('This element has been clicked!')
});
document.querySelector('#container').append(element);
```

This code creates a new `div` element, sets its `innerHTML`, adds an event handler to run a particular function when that `div` is clicked on, and then adds it to an HTML element whose `id` is `container` (this code assumes that there is a HTML element whose `id` is `container`: you'll likely want to change the argument to `querySelector` to be whichever element you'd like to add an element to).

- You may find it helpful to edit `mail/static/mail/styles.css` to add any CSS you need for the application.
- Recall that if you have a JavaScript array, you can loop over each element of that array using `forEach`.
- Recall that normally, for `POST` and `PUT` requests, Django requires a CSRF token to guard against potential cross-site request forgery attacks. For this project, we've intentionally made the API routes CSRF-exempt, so you won't need a token. In a real-world project, though, always best to guard against such potential vulnerabilities!

How to Submit

If you don't already have it installed, install `submit50` by running `pip3 install submit50`. Then, execute the below, logging in with your GitHub username and password when prompted. For security, you'll see asterisks (`*`) instead of the actual characters in your password.

```
submit50 web50/projects/2020/summer/mail
```