chatserver.epmikida.repl.co
CSE 503
Introduction to Computer Science for Non-Majors

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Day 24
AJAX (Part 1)
Recap

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  - `@bottle.route()` → Tell bottle how to respond to requests
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  - `bottle.template()` → Respond with a templated html file
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- We learned how to run our own Python web server with bottle
  - `@bottle.route()` → Tell bottle how to respond to requests
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  - `bottle.template()` → Respond with a templated html file
  - `bottle.request.query` → Dictionary for the requests query string
Bottle Web Servers so far...

We are now able to write a web server which responds to HTTP requests

On the client side...how can we get user input?

How can we get information from the server without reloading the entire web page each time?
Over the next two lectures we will build up a working chat server

**End Goal:** chatserver.epmikida.repl.co

Much of the code will be using concepts we've already learned.

We'll be adding something called AJAX (probably next lecture)
Chat Server Design

Before we code: Let's figure out the different parts of our web app and set up our file structure

(when working on larger projects, laying out a basic structure and understanding how pieces interact keeps you organized)
End Goal

Chat Server

Client

Client

Client

Client
Chat Server
Continuously running
Serves client requests for the main web page
Serves client requests for the chat logs
Updates the chat logs as clients send messages
Chat Server Design

What do we need:
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1. A front end web page (with interactive components)
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   even after the page is initially loaded
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Note this is just one possible design!
Chat Server Design - File Structure

For now let's setup the following (in a Python REPL with bottle):

- **main.py**: Our Python server code
- **index.html**: Our web page
- **chat.js**: JavaScript for interacting with the web page
- **chat.txt**: A file to store the chat logs
- **chat.py**: Python code for reading and writing our logs
To start, let's set up a basic web server to serve our HTML file...
import bottle

@bottle.route('/'
)
def index():
    return bottle.static_file("index.html", root="")

bottle.run(host="0.0.0.0", port=8080, debug=True)
import bottle

@bottle.route('/
')
def index():
    return bottle.static_file("index.html", root="")

bottle.run(host="0.0.0.0", port=8080, debug=True)

Import the bottle library (don't forget to install it)
import bottle

@bottle.route('/

def index():
    return bottle.static_file("index.html", root="")

bottle.run(host="0.0.0.0", port=8080, debug=True)
import bottle

@bottle.route('/

def index():
    return bottle.static_file("index.html", root="")

bottle.run(host="0.0.0.0", port=8080, debug=True)
Now we can write the HTML for the web page...

It will include some new things we have not seen yet
<html>
<head>
  <script src="chat.js"></script>
</head>

<body onload="loadChat();">
  <div id="chat"></div>
  Message: <input type="text" id="message"><br/>
  <button onclick="sendMessage();">Send</button>
</body>
</html>
Load our JavaScript file in head so it is available for us to use
Use the `onload` attribute of our `body` element to call the `loadChat()` function from our JavaScript file.

```html
<html>
<head>
  <script src="chat.js"></script>
</head>

<body onload="loadChat();">
  <div id="chat"></div>
  Message: <input type="text" id="message"><br/>
  <button onclick="sendMessage();">Send</button>
</body>
</html>
```
Create a `<div>` element and set its `id` so we have somewhere for our JavaScript file to put the chat messages.
We can create an input element with type set to "text" to create a text box.

By giving it an id we can access it from our JavaScript code.
The `button` element is used to create a clickable button.

The `onClick` attribute allows us to set a function to be called when it is clicked (we'll define it in our JS)

The text between the open and close tag shows up on the button.
Now that we have the HTML, we need to define the JavaScript code that it was expecting – chat.js
function loadChat()
{
  // Load the chat...
}

function sendMessage()
{
  // Send a message
}
function loadChat()
{
  // Load the chat...
}

function sendMessage()
{
  // Send a message
}
Front End JavaScript (chat.js)

```javascript
function loadChat()
  // Load the chat...
}

function sendMessage()
  // Send a message
}
```

For now we can just have them do something simple, we'll create more complicated versions of them later.

This lets us set up the structure and put together the main pieces, without focusing on complex details until later...
A Minimal Test

With larger projects, don't expect to get everything working right away!

Let's do a sanity check now, just to see if we can request the web page from the server and display it...
What Went Wrong?

Why didn't our JavaScript update the web page?
What Went Wrong?

Why didn't our JavaScript update the web page?

Let's check the web server output...
What Went Wrong?

Why didn't our JavaScript update the web page?

Let's check the web server output...

Our server got a request for chat.js...did we handle that request?
HTML and HTTP Requests

```html
<html>
<head>
  <script src="chat.js"></script>
</head>

<body onload="loadChat();">
  <div id="chat"></div><br/>
  Message: <input type="text" id="message"><br/>
  <button onClick="sendMessage();">Send</button>
</body>
</html>
```
On this line, we want to load `chat.js`... but where is `chat.js` located?
On this line, we want to load chat.js... but where is chat.js located?

On the server!
On this line, we want to load chat.js...but where is chat.js located?

On the server!

Loading a .js file sends a request to the server for that file...
import bottle

@bottle.route('/

def index():
    return bottle.static_file("index.html", root="")

bottle.run(host="0.0.0.0", port=8080, debug=True)

Our server currently only handles requests for "/"
import bottle

@bottle.route('/')
def index():
    return bottle.static_file("index.html", root="")

bottle.run(host="0.0.0.0", port=8080, debug=True)

Our server currently only handles requests for "/"
Let's add the option to handle requests for "/chat.js" as well...
Handling the chat.js Request

```python
import bottle

@bottle.route('/

def index():
    return bottle.static_file("index.html", root="")

@bottle.route('/chat.js')
def chatJS():
    return bottle.static_file("chat.js", root="")

bottle.run(host="0.0.0.0", port=8080, debug=True)
```
import bottle

@bottle.route('/')
def index():
    return bottle.static_file("index.html", root="")

@bottle.route('/chat.js')
def chatJS():
    return bottle.static_file("chat.js", root="")

bottle.run(host="0.0.0.0", port=8080, debug=True)
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Now we can create a place on the server to store the chat logs...
Storing Chat Logs (chat.txt)

Now we can create a place on the server to store the chat logs...

In this case we can just store them in a text file (let's call it chat.txt)
Now that we have a place to store our chat, we need to be able to read and write from the chat logs.

We'll write this in chat.py to keep it separate from server code.
filename = "chat.txt"

def get_chat():
    full_chat = []
    with open(filename) as file:
        for line in file:
            full_chat.append({"message": line.rstrip("\n")})
    return full_chat

def add_message(message):
    with open(filename, "a") as file:
        file.write(message + "\n")
filename = "chat.txt"  

Create a variable with the filename so we can refer to it throughout the rest of the code

def get_chat():
    full_chat = []
    with open(filename) as file:
        for line in file:
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def get_chat():
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        for line in file:
            full_chat.append({"message": line.rstrip("
")})
    return full_chat

def add_message(message):
    with open(filename, "a") as file:
        file.write(message + "\n")

Read from the chat file, and return a list of messages. We've put the messages in a dictionary...more on that later.
filename = "chat.txt"

def get_chat():
    full_chat = []
    with open(filename) as file:
        for line in file:
            full_chat.append({'message': line.rstrip('
')})
    return full_chat

def add_message(message):
    with open(filename, "a") as file:
        file.write(message + "\n")

Write a function to add a new message to the chat file. Note the file mode: "a". This means append.
Reading and Writing Chat Logs (chat.py)

Note that chat.py does not have any server code...it just reads and writes files, and we can test it just like any other Python code.
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When building applications from smaller pieces, make sure to test the pieces individually, let's do that now with chat.py.
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Next lecture we'll tackle step 5 and bring it all together