Recap

- Last time we started making our own chat server...
End Goal

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:

1. A front end web page (with interactive components)
2. Front end JavaScript allowing users to interact with the page
3. Web server code to run the server and handle requests
4. A place to store messages that persists even when server stops
5. A way for the front end and back end to communicate even after the page is initially loaded

Note this is just one possible design!
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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"

```python
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):
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Create a variable with the filename so we can refer to it throughout the rest of the code.
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    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.rsplit("
")})
    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.
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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Now we can set up our communication...

How can our JavaScript client and Python web server communicate?
Communication Between Client and Server

Now we can set up our communication...

How can our JavaScript client and Python web server communicate?

JSON!
JSON in JavaScript and Python

In Python:

```python
import json
json.loads(json_string)
json.dumps(python_data)
```

In JavaScript:

```javascript
JSON.parse(jsonString)
JSON.stringify(jsData)
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In Python:

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import json  # Loads the JSON library
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Server-Side Communication

Let's start by setting up the communication coming from the server:

1. The server will send the chat to the client
2. The server will accept messages from the client (and send chat)
Importing the Necessary Pieces

In `main.py`:
- Import the `json` library and the code we wrote in `chat.py`

```python
import bottle
import json
import chat
```
Adding Some New Routes

In main.py:
● Add a route to handle requests for the chat logs
● Respond with the chat, converted to a JSON string by `json.dumps()`

```python
@bottle.route('/chat')
def get_chat():
    return json.dumps(chat.get_chat())
```
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def get_chat():
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```

We wrote this function earlier...
Adding Some New Routes

In `main.py`:

- Add a `bottle.post` annotation for when a client sends a message
  - Decode the message (turn it into the JSON string and convert to Python)
  - Call our `add_message` function to add the message to the chat logs
  - Respond to the client with the full chat

```python
@bottle.post('/send')
def do_chat():
    content = bottle.request.body.read().decode()
    content = json.loads(content)
    chat.add_message(content['message'])
    return json.dumps(chat.get_chat())
```
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The `bottle.post` annotation lets us handle a POST request (as compared to GET).
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`bottle.request.body` contains the information sent in the request.
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    return json.dumps(chat.get_chat())
```

These are the functions we wrote earlier.
JavaScript and AJAX

Now we need our JavaScript code to communicate with our Python code.
We'll do this with **AJAX** (Asynchronous JavaScript and XML)

- Allows us to make requests *after* the page has been loaded
- Can make HTTP GET requests (to get content from a server)
- Can make HTTP POST requests (to send content to a server)
function ajaxGetRequest(path, callback) {
    let request = new XMLHttpRequest();
    request.onreadystatechange = function() {
        if (this.readyState === 4 && this.status === 200) {
            callback(this.response);
        }
    }
    request.open("GET", path);
    request.send();
}
function `ajaxGetRequest` (path, callback) {

  Don't worry too much about the details of this function... feel free to use it as is.

  The main thing to know is that it takes a path and a callback as input, and makes a GET request to that path

  request.open("GET", path);
  request.send();
}
function ajaxPostRequest(path, data, callback) {
    let request = new XMLHttpRequest();
    request.onreadystatechange = function() {
        if (this.readyState === 4 && this.status === 200) {
            callback(this.response);
        }
    };
    request.open("POST", path);
    request.send(data);
}
function ajaxPostRequest(path, data, callback) {
  
  Don't worry too much about the details of this function... feel free to use it as is.

  It works the same as the previous, but also requires data as input, and makes a POST request to the path

  request.open("POST", path);
  request.send(data);
}
function loadChat() {
    ajaxGetRequest("/chat", displayChat);
}

function displayChat(response) {
    let chat = "";
    for(let data of JSON.parse(response)){
        chat = chat + data.message + "\n";
    }
    document.getElementById("chat").innerHTML = chat;
}
function loadChat() {
    ajaxGetRequest("/chat", displayChat);
}

function displayChat(response) {
    let chat = "";
    for(let data of JSON.parse(response)){
        chat = chat + data.message + "</br>";
    }
    document.getElementById("chat").innerHTML = chat;
}
function loadChat() {
    ajaxGetRequest("/chat", displayChat);
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function displayChat(response) {
    let chat = "";
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function displayChat(response) {
    let chat = "";
    for(let data of JSON.parse(response)){
        chat = chat + data.message + "</br>";
    }
    document.getElementById("chat").innerHTML = chat;
}
function sendMessage()
{
    let messageElement = document.getElementById("message");

    let message = messageElement.value;
    messageElement.value = "";
    let toSend = JSON.stringify({"message": message});

    ajaxPostRequest("/send", toSend, displayChat);
}
function sendMessage() {
  let messageElement = document.getElementById("message");

  let message = messageElement.value;
  messageElement.value = "";
  let toSend = JSON.stringify({"message": message});

  ajaxPostRequest("/send", toSend, displayChat);
}
Using Our New Functions

```javascript
function sendMessage(){
    let messageElement = document.getElementById("message");

    let message = messageElement.value;  // Then get the text and clear it
    messageElement.value = "";

    let toSend = JSON.stringify({"message": message});

    ajaxPostRequest("/send", toSend, displayChat);
}
```
function sendMessage(){
    let messageElement = document.getElementById("message");

    let message = messageElement.value;
    messageElement.value = "";
    let toSend = JSON.stringify({"message": message});

    ajaxPostRequest("/send", toSend, displayChat);
}

Finally, convert it to JSON and send it in a POST request
Extending Our Example

What if we wanted to include our name with each message?

What would we need to add/change in our code?
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What would we need to add/change in our code?

1. We must have a way to input our name (in `index.html`)
2. We must send the name and message to the server (in `chat.js`)
What if we wanted to include our name with each message?

What would we need to add/change in our code?

1. We must have a way to input our name (in index.html)
2. We must send the name *and* message to the server (in chat.js)
3. The server must store the name *and* message (in chat.py)
What if we wanted to include our name with each message?

What would we need to add/change in our code?

1. We must have a way to input our name (in index.html)
2. We must send the name and message to the server (in chat.js)
3. The server must store the name and message (in chat.py)
4. The server must send the names and messages (in main.py)
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