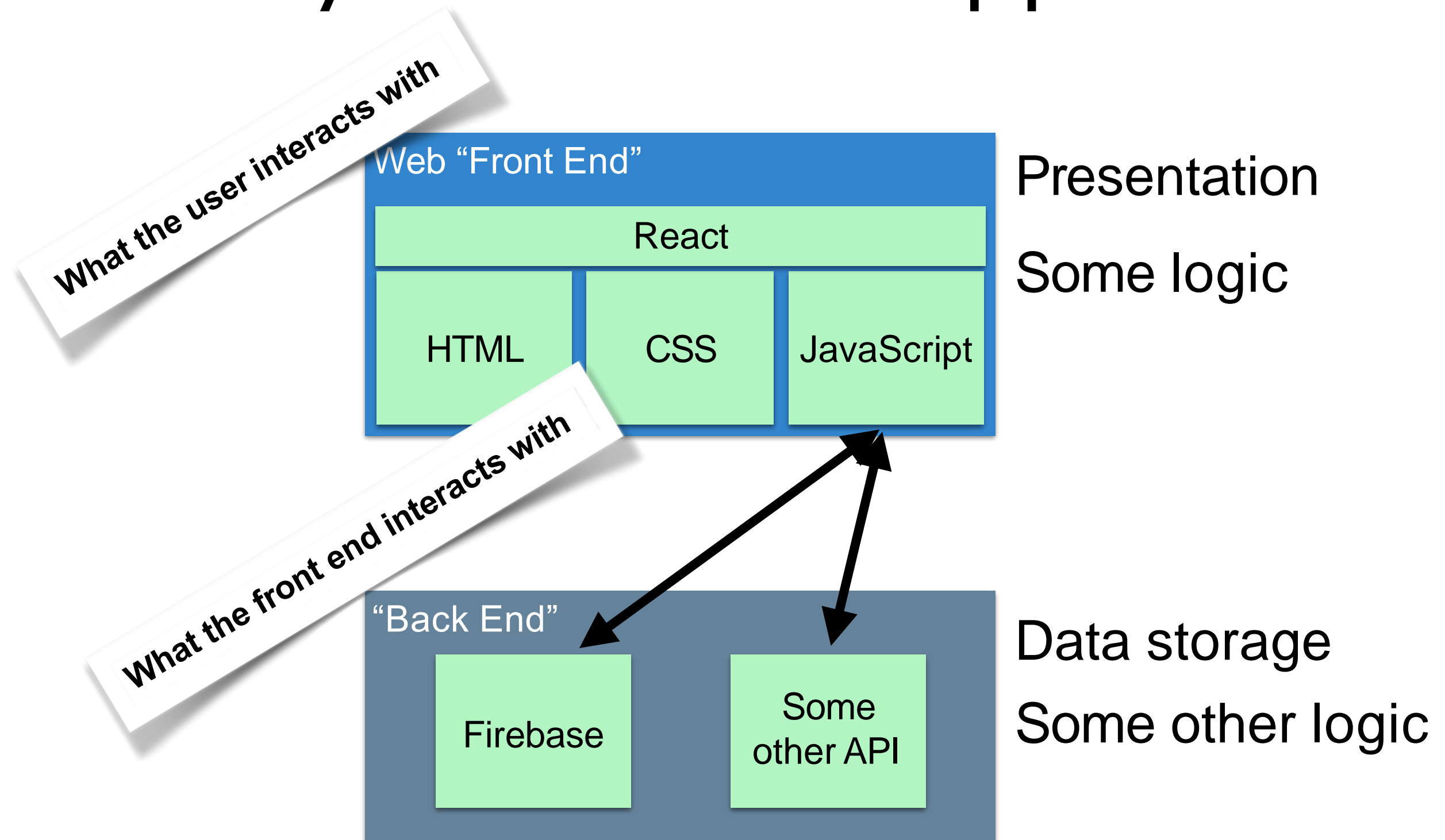


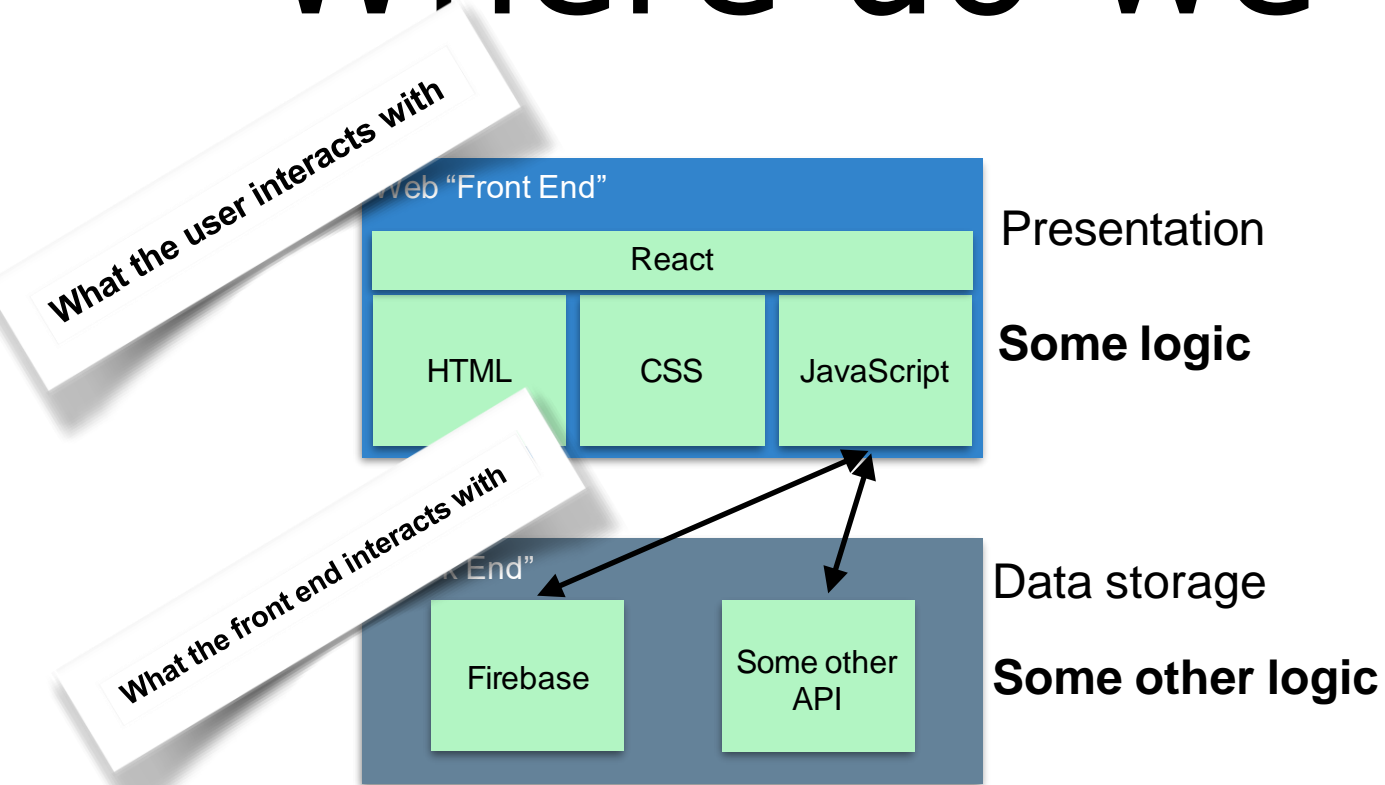
Why we need backends

- Security: *SOME* part of our code needs to be “trusted”
 - Validation, security, etc. that we don’t want to allow users to bypass
- Performance:
 - Avoid duplicating computation (do it once and cache)
 - Do heavy computation on more powerful machines
 - Do data-intensive computation “nearer” to the data
- Compatibility:
 - Can bring some dynamic behavior without requiring much JS support

Dynamic Web Apps



Where do we put the logic?



Frontend

Pros

Very responsive (low latency)

Cons

Security

Performance

Unable to share between front-ends

Backend

Pros

Easy to refactor between multiple clients

Logic is hidden from users (good for security, compatibility, and intensive computation)

Cons

Interactions require a round-trip to server

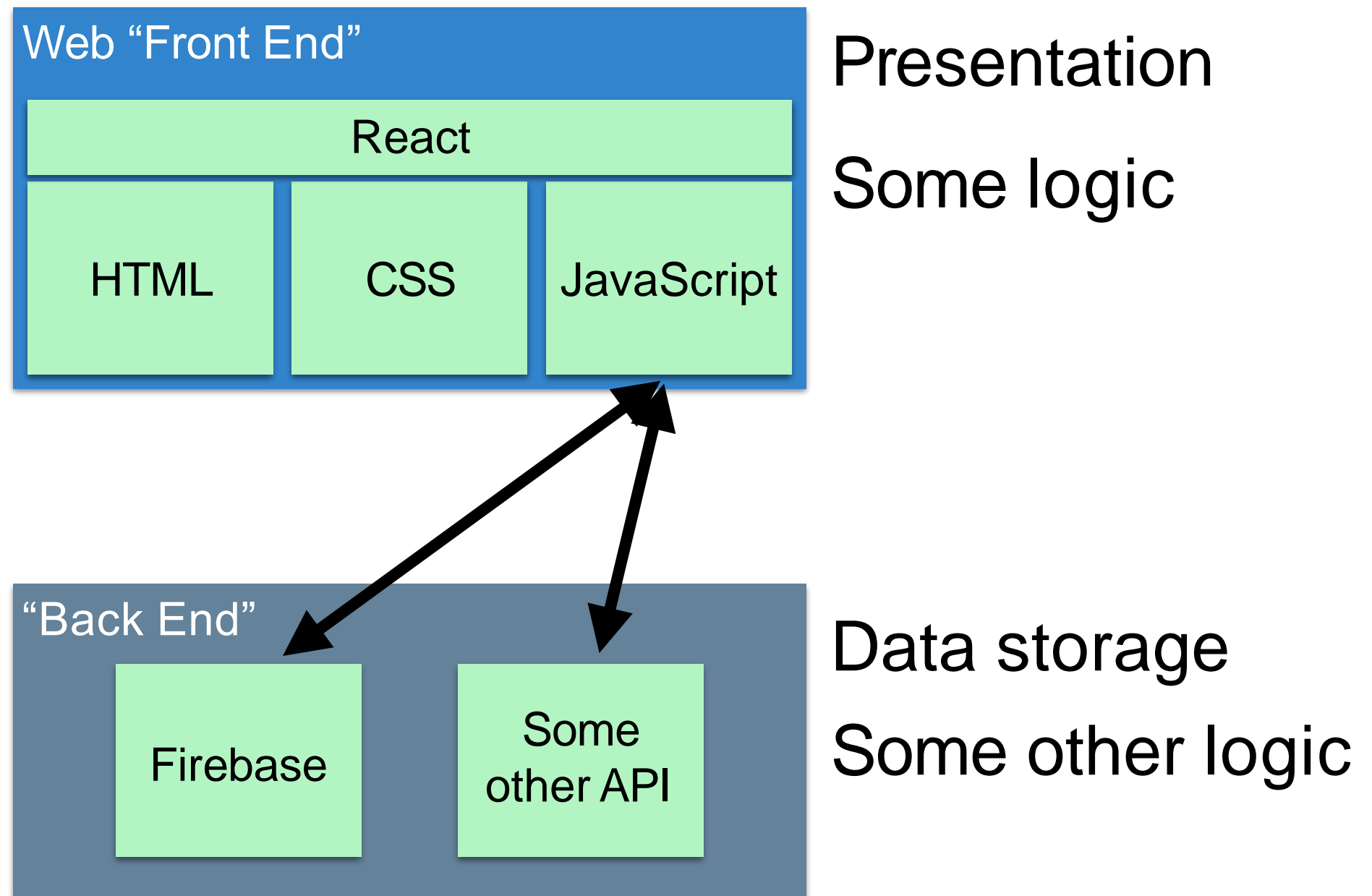
Why Trust Matters

- Example: Transaction app

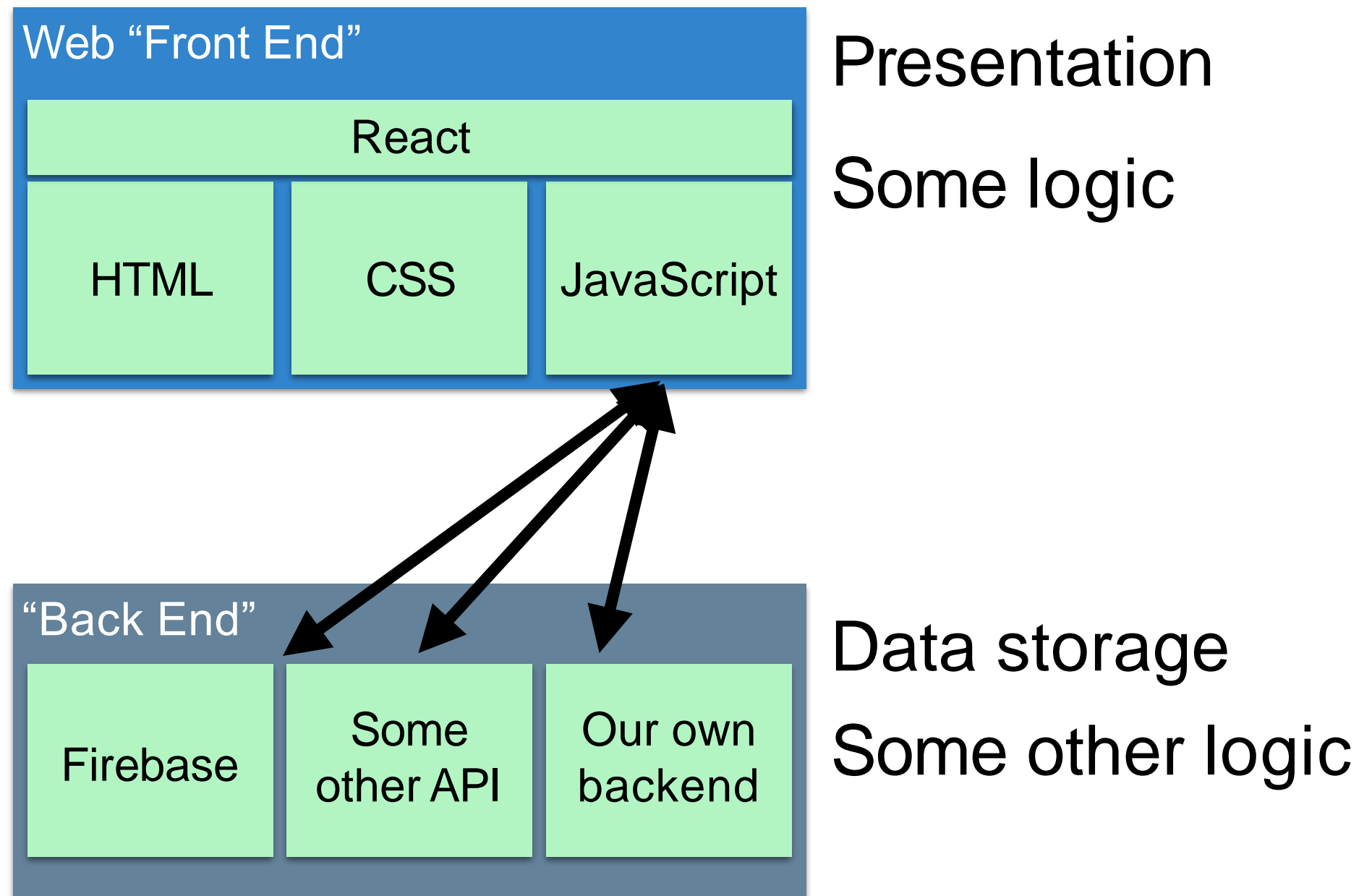
```
function updateBalance(user, amountToAdd)
{
  user.balance = user.balance + amountToAdd;
  fireRef.child(user.username).child("balance").set(user.balance);
}
```

- What's wrong?
- How do you fix that?

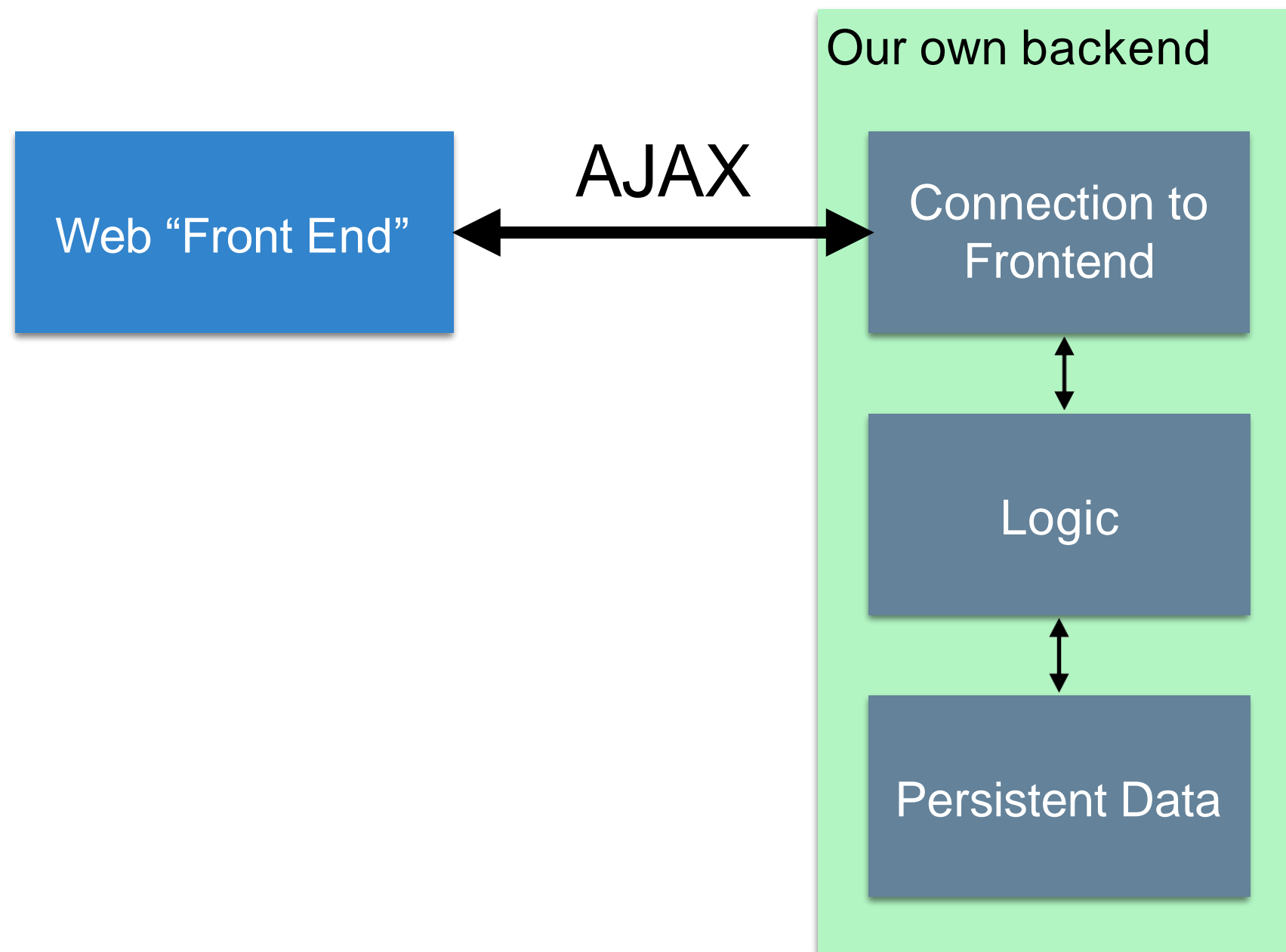
Dynamic Web Apps



Dynamic Web Apps



What does our backend look like?



The “good” old days of backends

HTTP Request

GET /myApplicationEndpoint **HTTP/1.1**

Host: cs.gmu.edu

Accept: text/html

web server



Runs a program

Give me /myApplicationEndpoint

Web Server
Application

My
Application
Backend

Does whatever it wants

Here's some text to send back

HTTP Response

HTTP/1.1 200 OK

Content-Type: text/html; charset=UTF-8

<html><head>...

What is socket address?

localhost – 127.0.0.1:5000
 ip address port number

Network ip ~ 192.168.72.2

ipconfig command in terminal

Creating a virtual env

```
python -m venv env
```

```
.\env\Scripts\activate
```

A screenshot of a terminal window with a dark background. The text "(env) C:\Users\aryam\O" is displayed in a monospaced font, with the characters colored in a rainbow gradient. This indicates that the virtual environment named 'env' has been successfully activated.

```
(env) C:\Users\aryam\O
```

Installing Dependencies

```
pip install flask  
pip install firebase_admin  
pip install bcrypt
```

References

[HTTP request methods - HTTP | MDN \(mozilla.org\)](#)

[HTTP Status Codes — httpstatuses.io](#)

[Get data with Cloud Firestore | Firebase \(google.com\)](#)