

Build Your First Real-Time Interactive Web App *with NodeJS, Express & SocketIO*

Liz: Welcome! Enter your name and message and click the Send button. This is a live chatroom!

Anonymous

Write your message here

Send

Learning with Black Boxes



Blackboxing is *"the way scientific and technical work is made invisible by its own success."*

When a machine runs efficiently, when a matter of fact is settled, one need focus only on its inputs and outputs and not on its internal complexity.

Thus, paradoxically, the more science and technology succeed, the more opaque and obscure they become."

-- **Bruno Latour**

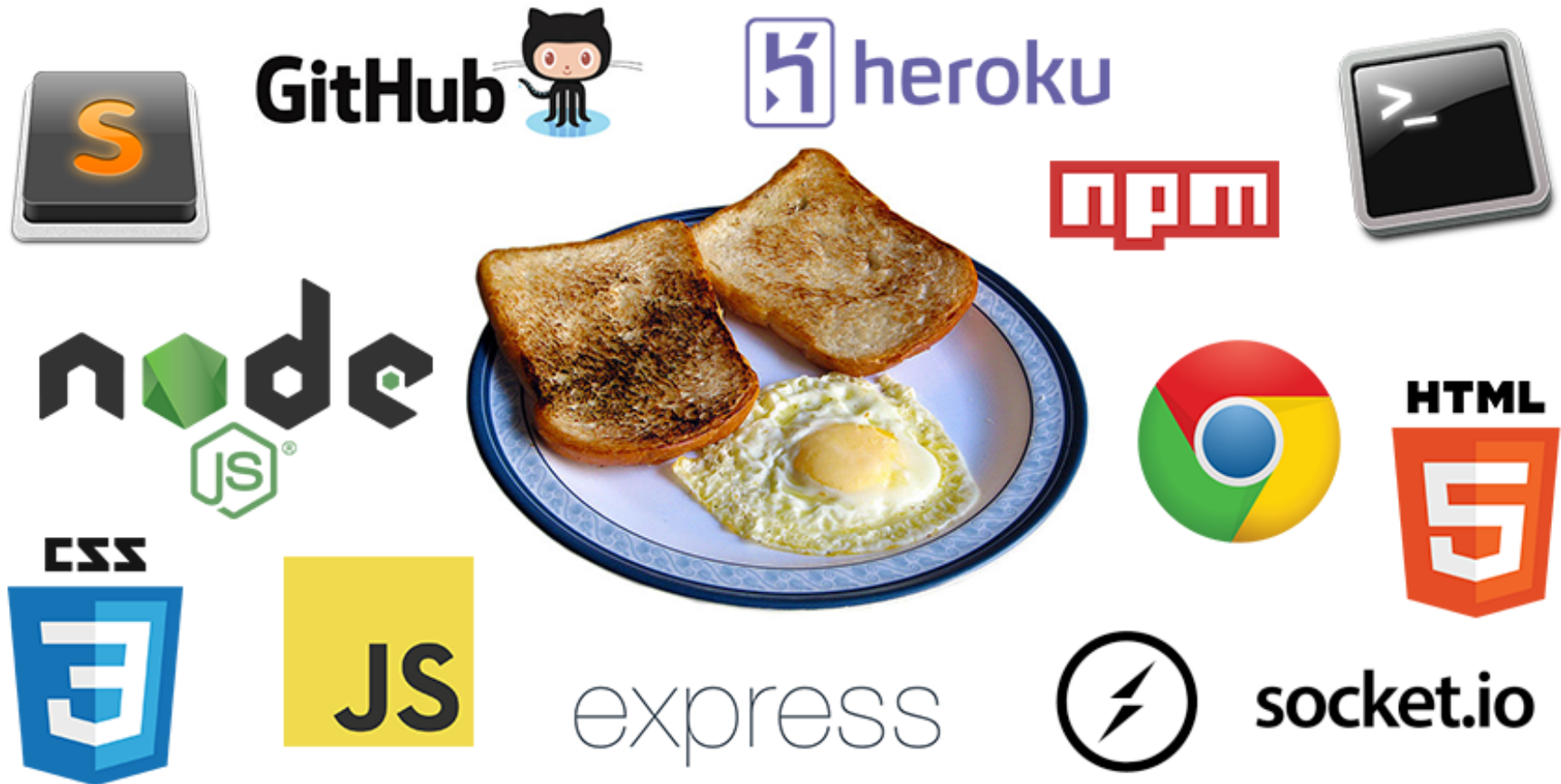
Anything can be a black box
and they're everywhere!



Photos of bread/toast by **Rainer Zenz**

Tools we're using today

Even if you don't completely understand how all these tools work yet, you can still use them to make ~~a delicious breakfast~~ a cool web app!



Delicious breakfast photo by [Asimzb](#) on Wikimedia

Tools we're using today

JavaScript Tools:Web Services:

- NodeJS
- npm
- Express
- SocketIO
- GitHub
- Heroku

Languages:

- HTML
- CSS
- JavaScript

Software Tools:

- Text Editor
- Command Lin
Interface
- Web Browser

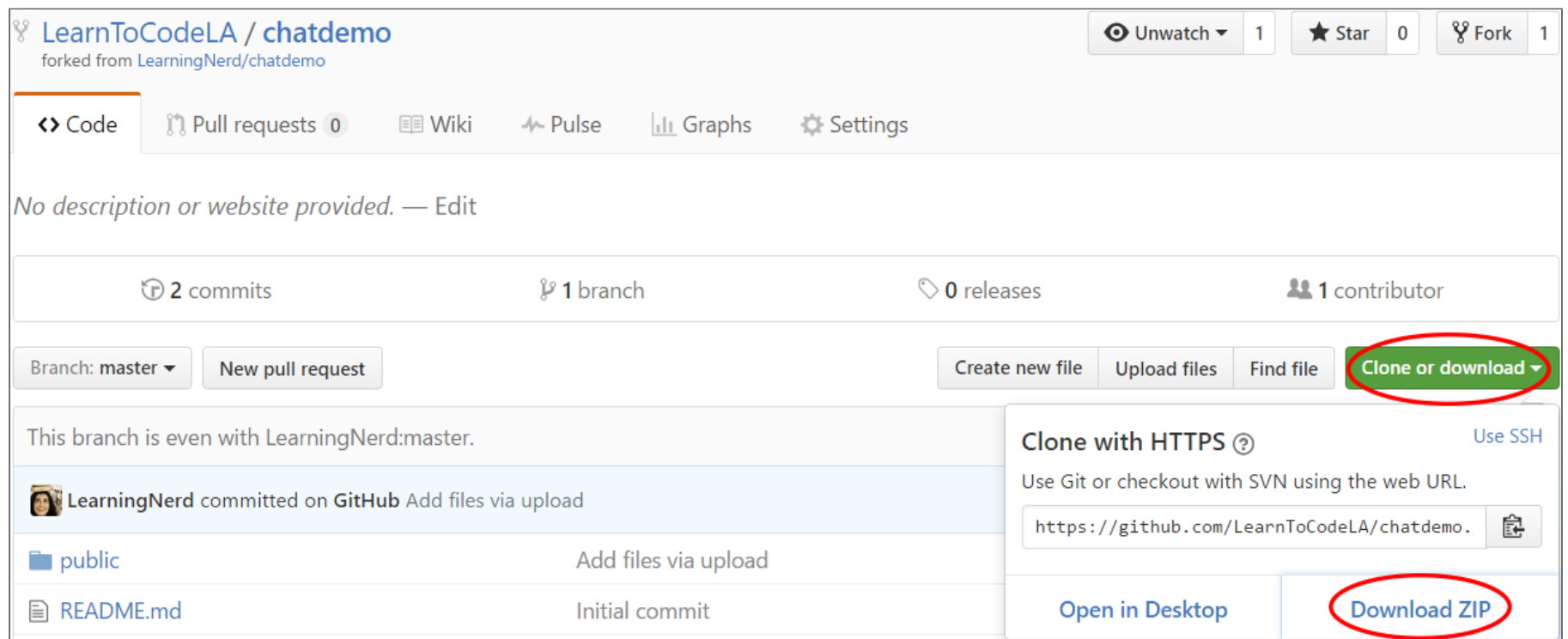
First things first:

Setup and Installation

Download the sample code

Go to the link below, click the green "Clone or download" button, then click "Download ZIP"

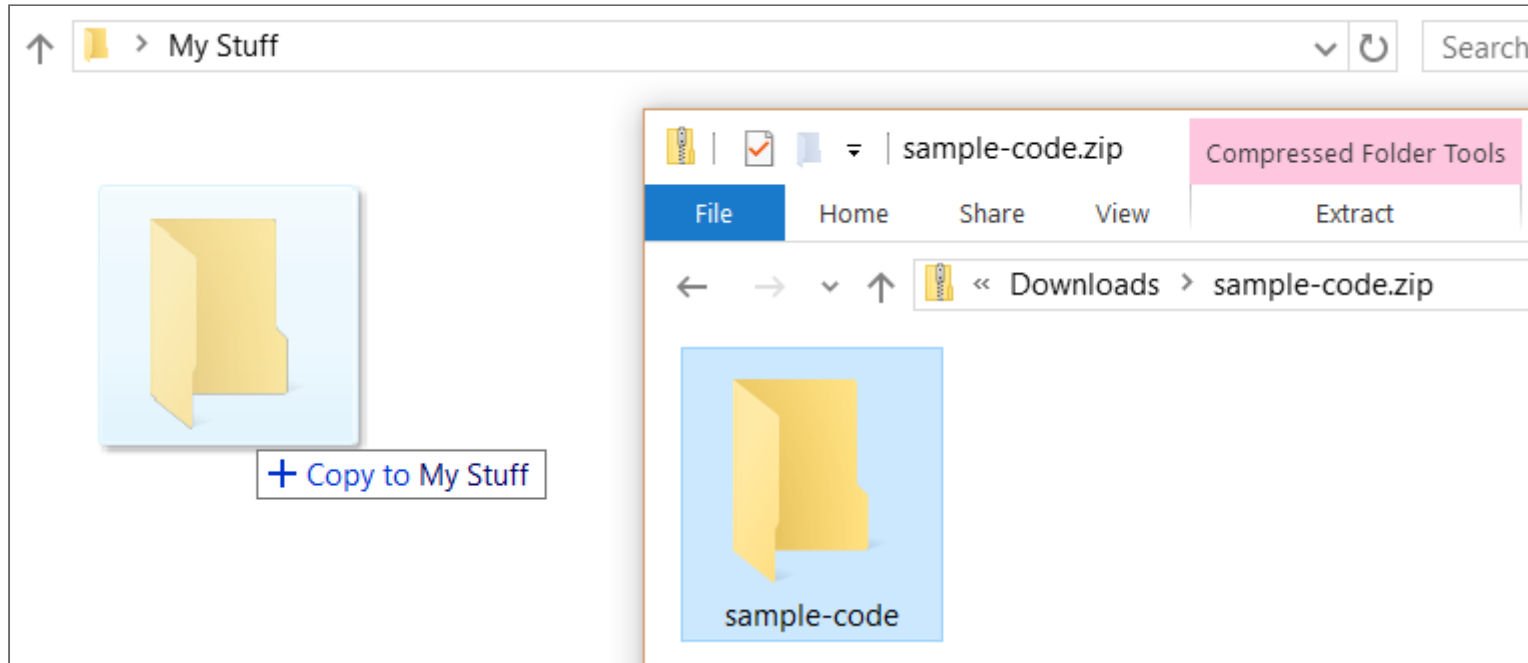
<https://github.com/LearnToCodeLA/chatdemo>



The screenshot shows the GitHub repository page for **LearnToCodeLA / chatdemo**, which is a fork of **LearningNerd/chatdemo**. The repository has 1 watch, 0 stars, and 1 fork. The main navigation bar includes links for Code, Pull requests (0), Wiki, Pulse, Graphs, and Settings. Below the navigation bar, it states "No description or website provided. — Edit". The repository statistics show 2 commits, 1 branch, 0 releases, and 1 contributor. The branch is set to **master**, and there is a button for "New pull request". Action buttons include "Create new file", "Upload files", "Find file", and the highlighted "Clone or download" button. A dropdown menu is open from the "Clone or download" button, showing options to "Clone with HTTPS" (with a help icon) and "Use SSH". The HTTPS URL is `https://github.com/LearnToCodeLA/chatdemo.`. At the bottom of the dropdown, there are two buttons: "Open in Desktop" and "Download ZIP", with the latter being circled in red. The repository content area shows a commit by **LearningNerd** with the message "Add files via upload". Below the commit, there is a file tree with a folder named **public** and a file named **README.md**. The **public** folder has an "Add files via upload" link, and the **README.md** file has an "Initial commit" link.

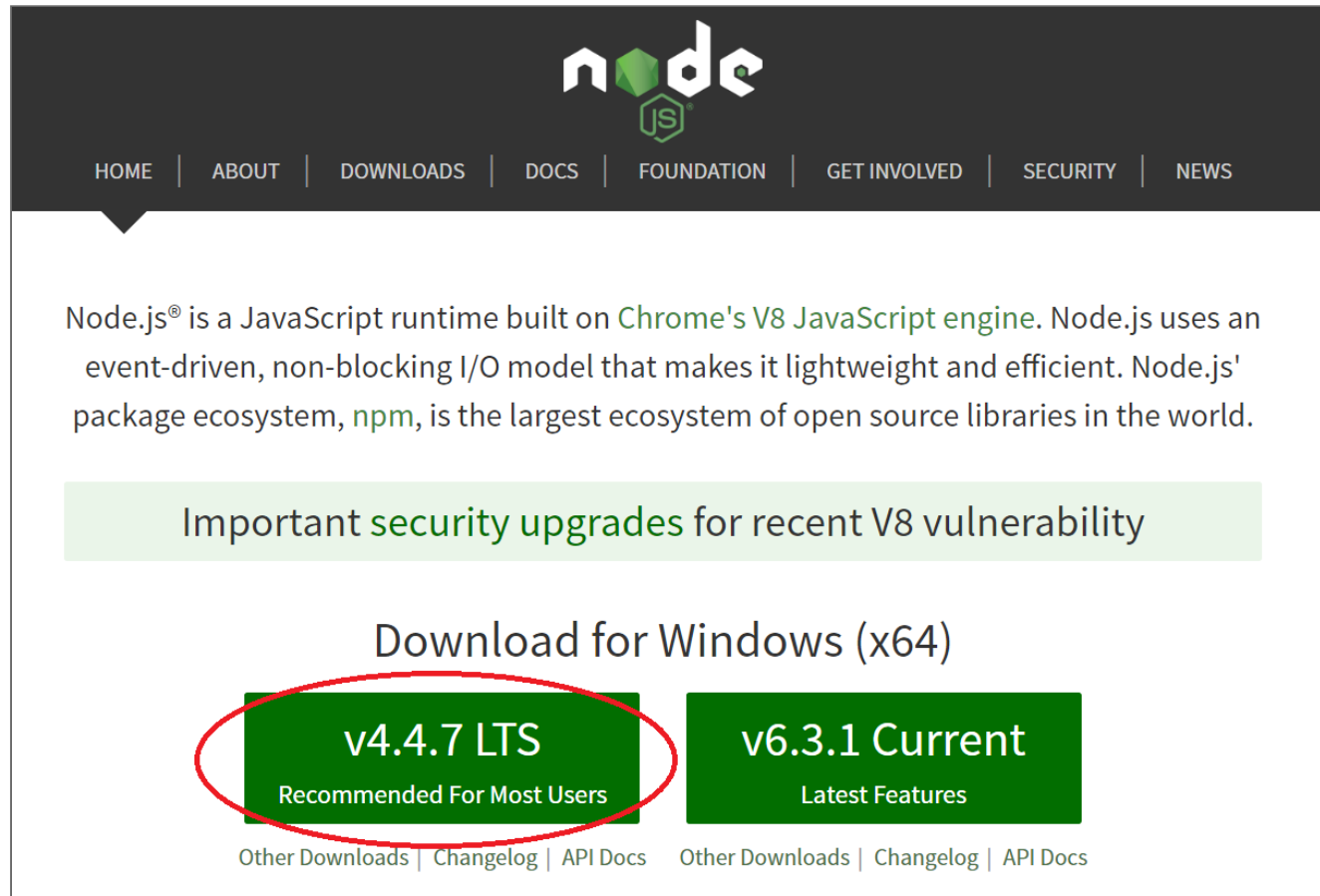
Unzip the project folder

Open up the downloaded .zip file; there will be a folder inside it. Move that folder onto your desktop (or another place where you can find it easily)



Install NodeJS from NodeJS.org

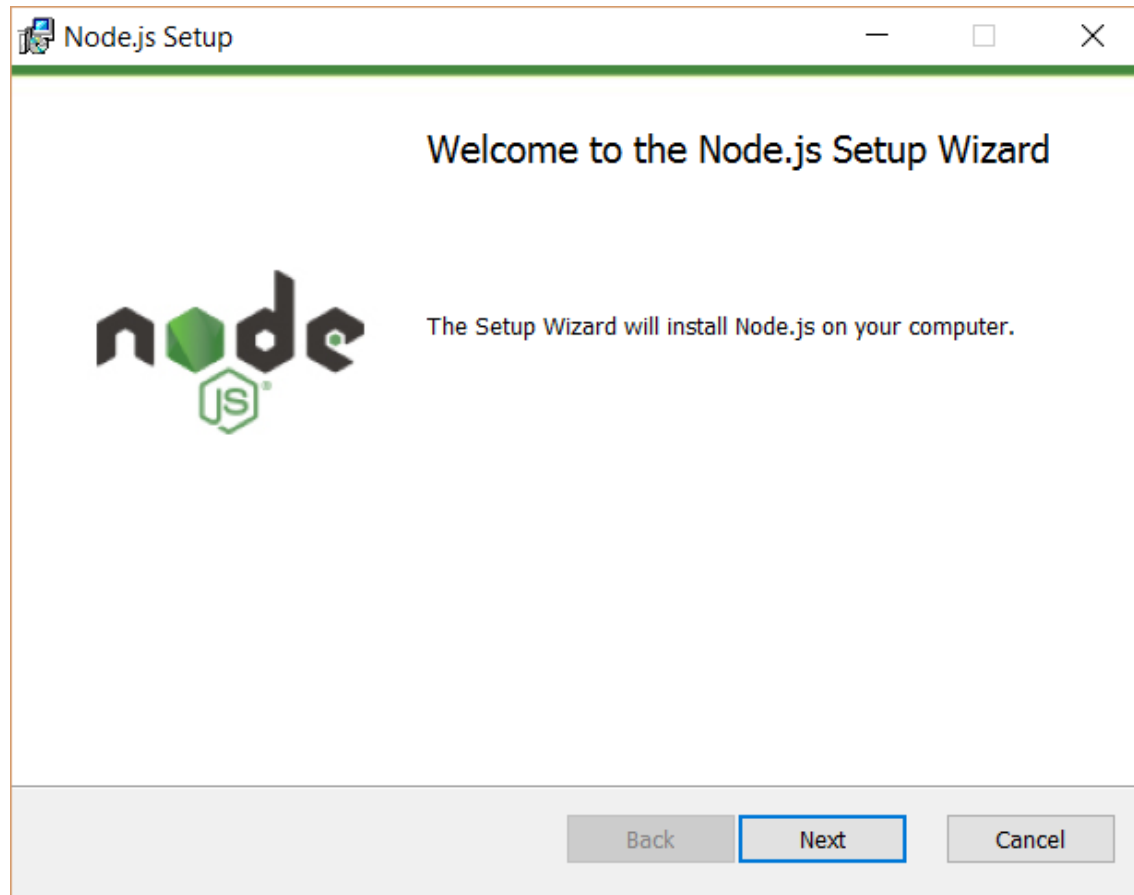
Choose the LTS "Recommended for Most Users" version:



The screenshot shows the Node.js website with the following content:

- Header:** Node.js logo and navigation links: HOME | ABOUT | DOWNLOADS | DOCS | FOUNDATION | GET INVOLVED | SECURITY | NEWS.
- Introductory Text:** "Node.js® is a JavaScript runtime built on Chrome's V8 JavaScript engine. Node.js uses an event-driven, non-blocking I/O model that makes it lightweight and efficient. Node.js' package ecosystem, npm, is the largest ecosystem of open source libraries in the world."
- Security Notice:** "Important security upgrades for recent V8 vulnerability"
- Download Section:** "Download for Windows (x64)"
- Version Selection:** Two green buttons are shown:
 - v4.4.7 LTS** (Recommended For Most Users) - This button is circled in red.
 - v6.3.1 Current** (Latest Features)
- Footer:** "Other Downloads | Changelog | API Docs" (repeated twice)

Then open the installer and follow the instructions. (Just click "Next" a bunch of times and let it do its thing; all the default settings should be fine.)



Time to geek out in the command line!

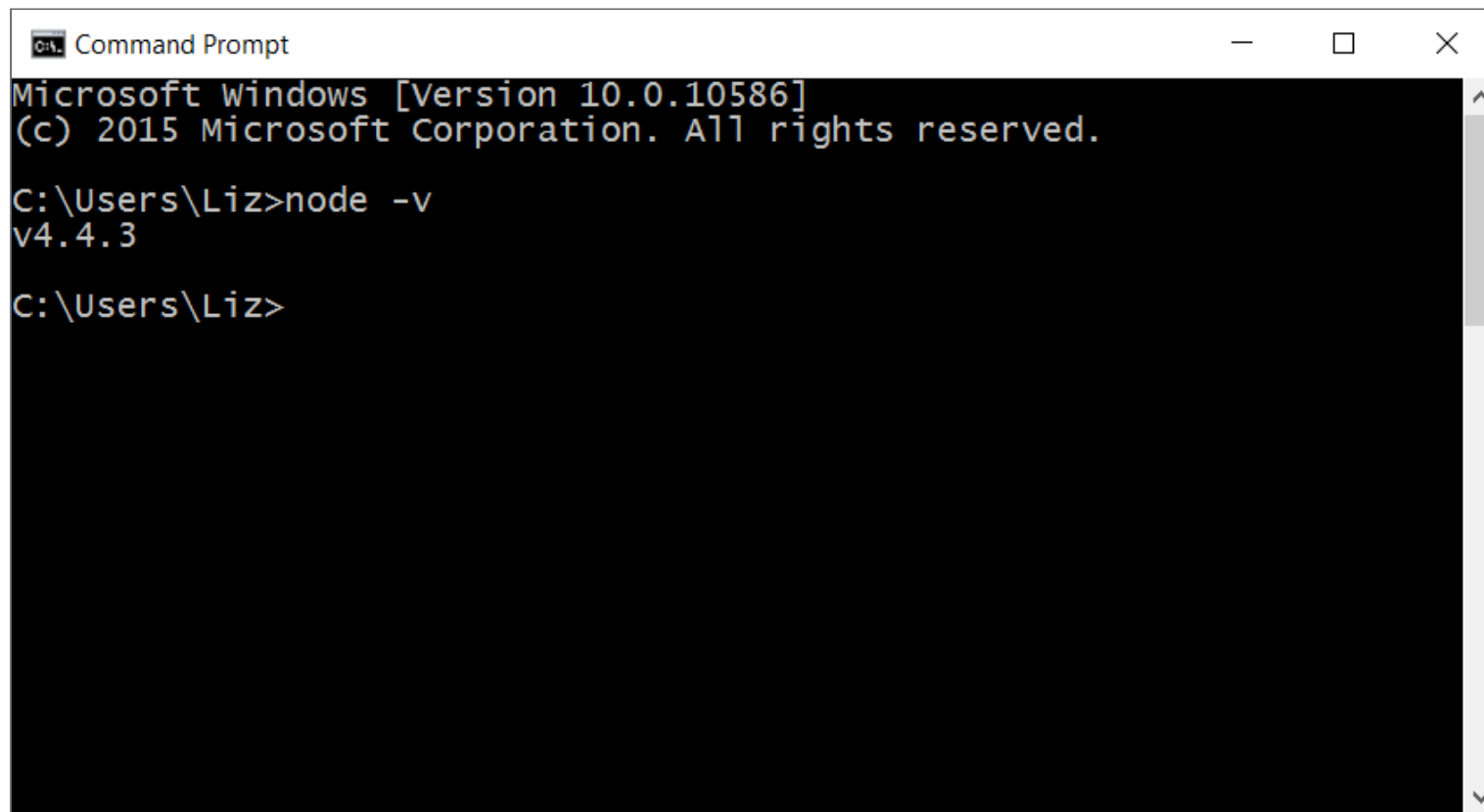
Windows: Open Command Prompt (you can search for it in the Start menu)

Mac: Open Terminal (you can search for it in Finder or Spotlight)



To check the version of NodeJS and confirm it installed correctly, type this and hit enter:

```
node -v
```



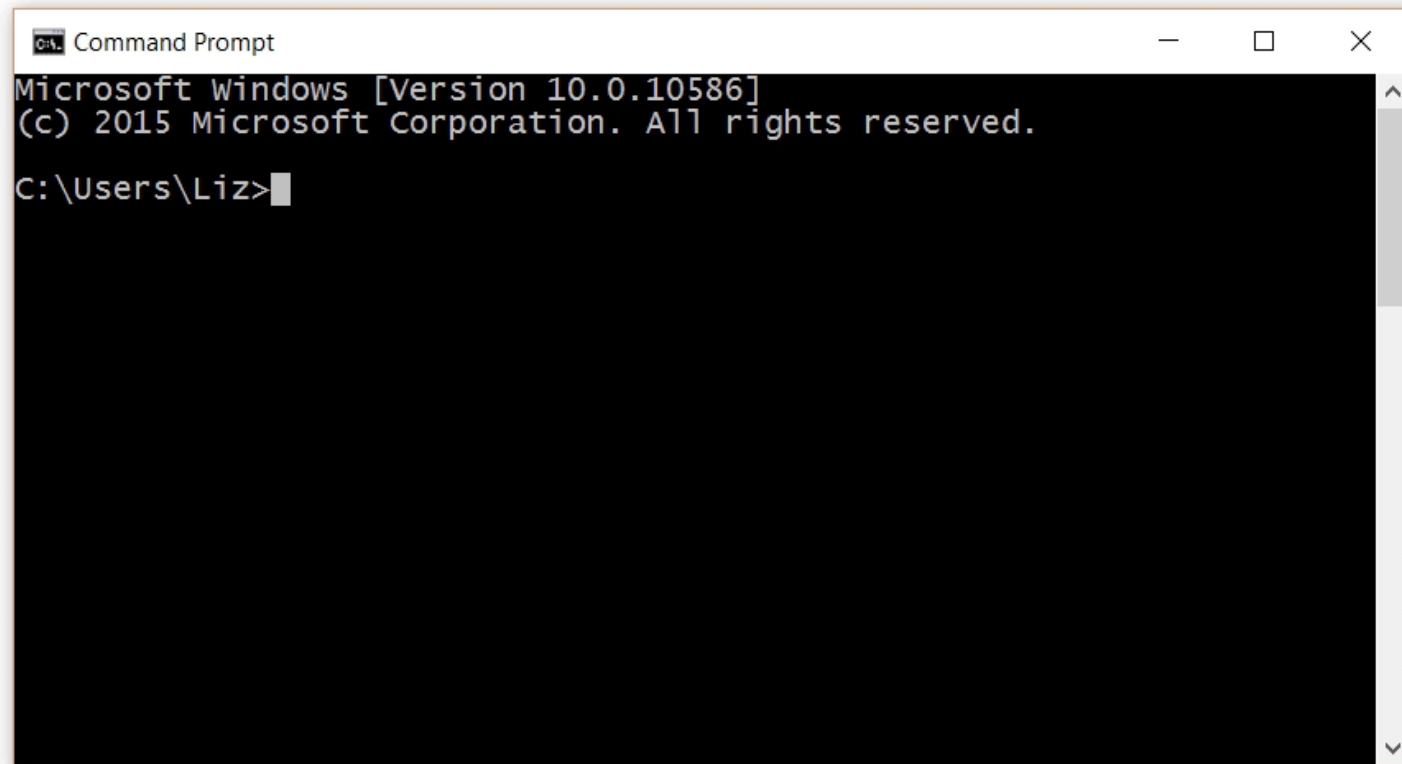
```
Command Prompt
Microsoft Windows [Version 10.0.10586]
(c) 2015 Microsoft Corporation. All rights reserved.

C:\Users\Liz>node -v
v4.4.3

C:\Users\Liz>
```

Next, let's **cd** or "Change Directories" to go into our project folder.

Here's a nifty trick: type "cd" followed by a space, and then drag and drop your folder into the command line and hit enter:

A screenshot of a Windows Command Prompt window. The title bar says 'Command Prompt'. The window content shows the text: 'Microsoft Windows [Version 10.0.10586] (c) 2015 Microsoft Corporation. All rights reserved. C:\Users\Liz>'. The prompt is at the end of the line, followed by a small black square cursor.

Install Express and SocketIO

Next we'll use **npm** to install the dependencies listed in our package.json file by typing this into the command line:

```
npm install
```

This will download a bunch of stuff and create a "node_modules" folder with all the code needed for **Express** and **SocketIO**.

Let's take a look at our files

Inside "chatdemo" folder:

- package.json
- app.js
- node_modules/
- public/
 - index.html
 - local.js
 - style.css



package.json

```
{
  "name": "socket-chat-example",
  "version": "0.0.1",
  "description": "my first socket.io app",
  "dependencies": {
    "express": "^4.10.2",
    "socket.io": "^1.4.8"
  },
  "engines": {
    "node": "4.4.3"
  },
  "scripts": {
    "start": "node app.js"
  }
}
```


app.js

```
var express = require("express");
var app = express();
var http = require('http').Server(app);
var io = require('socket.io')(http);
var port = process.env.PORT || 8000;

app.use(express.static('public'));

http.listen(port, function(){
  console.log('listening on ' + port);
});

io.on('connection', function(socket){

  console.log('A user connected!');

  socket.on('chat', function(data){
    console.log('CHAT: name: ' + data.name + ', message: ' + data.message);
    io.emit('chat', data);
  });
});
```

public/index.html

```
<!DOCTYPE html>
<html>
  <head>
    <title>Simple Chat App Demo</title>
    <meta charset="utf-8">
    <link rel="stylesheet" href="style.css">
  </head>

  <body>

    <div id="chat">
    </div>

    <div class="interface">
      <input id="nameinput" type="text" value="">
    </div>

    <script src="/socket.io/socket.io.js"></script>
    <script src="local.js"></script>
  </body>
</html>
```

public/style.css

```
body {
  font-size: 20px;
}
#chat {
  margin-bottom: 1em;
}
.message {
  padding: 0.5em;
}
.message:nth-child(even) {
  background-color: #eee;
}
.message:last-child {
  margin-bottom: 3.5em;
}
.username {
  font-weight: bold;
}

.interface {
  height: 3.5em;
}
```

public/local.js

```
var socket = io();

var sendButton = document.getElementById("send");
var nameInput = document.getElementById("nameinput");
var messageInput = document.getElementById("messageinput");

// if user clicks "Send" button, send message
sendButton.addEventListener("click", sendMessage);

// if ENTER key was pressed, send message
window.addEventListener("keypress", function(event){
  if (event.which === 13) {
    sendMessage();
  }
});

// when "chat" event received, display message
socket.on('chat', function(data){
  console.log('RECEIVED: name: ' + data.name + ', message: ' + data.message);
  displayNewMessage(data.name, data.message);
});
```

Boilerplate for NodeJS/Express/Socket.IO

Client

```
var socket = io();
```

Server

```
var express = require("express");
var app = express();
var http = require('http').Server(app);
var io = require('socket.io')(http);
var port = process.env.PORT || 8000;

app.use(express.static('public'));

http.listen(port, function(){
  console.log('listening on ' + port);
});
```

Do stuff when a user connects to server

```
// Server code (after boilerplate)
io.on('connection', function(socket){

  console.log('A user connected!');

});
```

Do something when a user disconnects from server

```
// Server code (after boilerplate)
io.on('connection', function(socket){

  socket.on('disconnect', function(msg){
    console.log('A user disconnected.');
```

Do something when server receives an event/message

```
// Server code (after boilerplate)
io.on('connection', function(socket){

  socket.on('event name here', function(data){
    console.log('Message received!');
  });

});
```

Sending stuff from client to server

Client

```
socket.emit('event name here',  
  'Sending a message! Or JSON data!'  
);
```

Server

```
// Server code (after boilerplate)  
io.on('connection', function(socket){  
  
  socket.on('event name here', function(data){  
    console.log('Message received!');  
  });  
  
});
```


Sending stuff from server to client(s)

Client

```
socket.on('event name here ', function(data){  
    console.log('Message recieved: ' + data);  
});
```

Server

```
// Server code (after boilerplate)  
io.on('connection', function(socket){  
  
    // send to ALL clients  
    io.emit('event name here', 'Hi all!');  
  
});
```

Let's run our app!

To run our web server and see our app in action, go back to the command line and run this command:

```
node app.js
```

This tells NodeJS to run our "app.js" file, which starts the web server and puts everything into action. If it works, you'll see a message in the command line that it's listening on port 8000.

Open the app in your web browser

To connect to our local web server, open a new tab in your web browser and go to the following URL:

```
http://localhost:8000
```

And you should see your app! Check the command line; if the connection is working, it will show the message "A user connected!"

Open the same URL in another browser tab and any messages you send will appear in both instances of your app. Cool, huh?


Now let's publish it online with GitHub and Heroku!

The quick and dirty way to upload to GitHub:

1. Log into GitHub and go to **<https://github.com/new>**
2. Name your new repo (the name doesn't matter)
3. Check the box next to "Initialize this repository with a README"
4. Click the green "Create repository" button

Create a new repository


A repository contains all the files for your project, including the revision history.


Owner
 LearningNerd ▾

/

Repository name
chatdemo ✓


Great repository names are short and memorable. Need inspiration? How about

☒  **Public**
Anyone can see this repository. You choose who can commit.

☐  **Private**
You choose who can see and commit to this repository.

☒ **Initialize this repository with a README**
This will let you immediately clone the repository to your computer.

Add .gitignore: None ▾

Add a license: None ▾ 

Create repository

The quick and dirty way to upload to GitHub:

5. On your new repository page, click on "Upload Files"

The screenshot shows the GitHub interface for a repository named 'chatdemo' by 'LearningNerd'. The repository has 2 commits, 1 branch, 0 releases, and 1 contributor. The 'Upload files' button is circled in red. Below the repository header, there is a table of files and folders, including 'public', 'README.md', 'app.js', and 'package.json'. The 'README.md' file is highlighted at the bottom.

LearningNerd / chatdemo

Unwatch 1 Star 0 Fork 0

Code Issues 0 Pull requests 0 Wiki Pulse Graphs Settings

No description or website provided. — Edit

2 commits 1 branch 0 releases 1 contributor

Branch: master New pull request Create new file Upload files Find file Clone or download

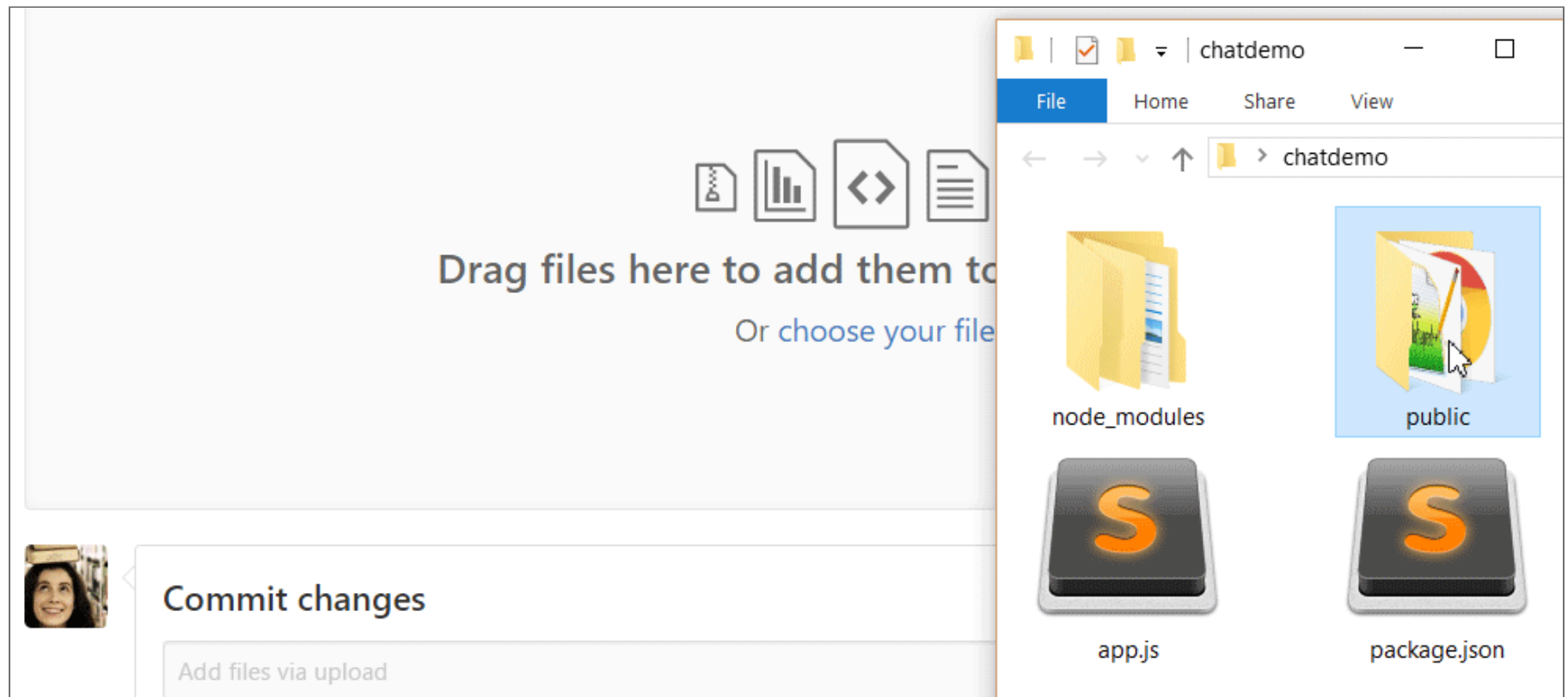
LearningNerd committed on GitHub Add files via upload Latest commit ebbbc4b an hour ago

public	Add files via upload	an hour ago
README.md	Initial commit	an hour ago
app.js	Add files via upload	an hour ago
package.json	Add files via upload	an hour ago

README.md

The quick and dirty way to upload to GitHub:

6. Drag and drop your project files from your local folder ***except for the "node_modules" folder***, then click the green "Commit changes" button




Now let's publish it live on Heroku:

1. Log into Heroku and go to **<https://dashboard.heroku.com/new>**
2. Give your app a unique name and click "Create App"

App Name (optional)

Leave blank and we'll choose one for you.




lizchat is available

Runtime Selection

Your app can run in your choice of region in the Common Runtime.

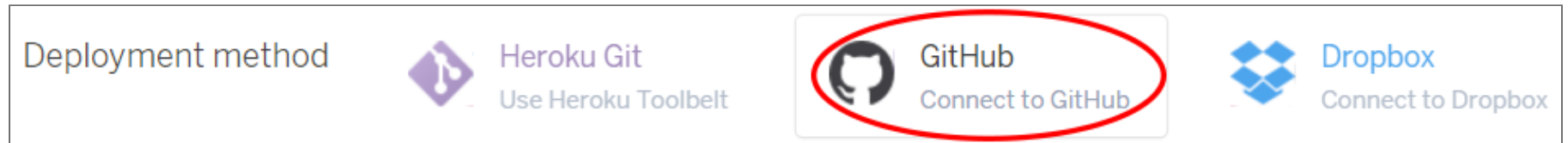
United States



Create App

Now let's publish it live on Heroku:

3. Next to "Deployment Method", click on GitHub



Now let's publish it live on Heroku:

1. Click "Connect to GitHub" at the bottom
5. Another window will open up; click "Authorize application" to link GitHub to Heroku

Connect to GitHub

Connect this app to GitHub to enable code diffs and deploys.

View your code diffs on GitHub

Connect your app to a GitHub repository to see commit diffs in the activity log.

Deploy changes with GitHub

Connecting to a repository will allow you to deploy a branch to your app.

Automatic deploys from GitHub

Select a branch to deploy automatically whenever it is pushed to.

Create review apps in pipelines

Pipelines connected to GitHub can enable review apps, and create apps for new

[Connect to GitHub](#)


Now let's publish it live on Heroku:

5. Next to "Connect to GitHub", search for the name of your GitHub repository and then click "Connect" when your repository name appears


Connect to GitHub

Connect this app to GitHub to enable code diffs and deploys.

Search for a repository to connect to

 LearningNerd ↕ chatdemo **Search**

Missing an organization? [Ensure Heroku Dashboard has organization access.](#)

 LearningNerd/chatdemo **Connect**

Now let's publish it live on Heroku:


7. Next to "Automatic Deploys", click "Enable Automatic Deploys" so that any future updates on GitHub will also update your app on Heroku

Automatic deploys

Enables a chosen branch to be automatically deployed to this app.

Enable automatic deploys from GitHub

Every push to the branch you specify here that this branch is always in a deployable state will automatically deploy your app.

 master


☐ Wait for CI to pass before deploy

Only enable this option if you have a Continuous Integration service configured for your repository.

Enable Automatic Deploys

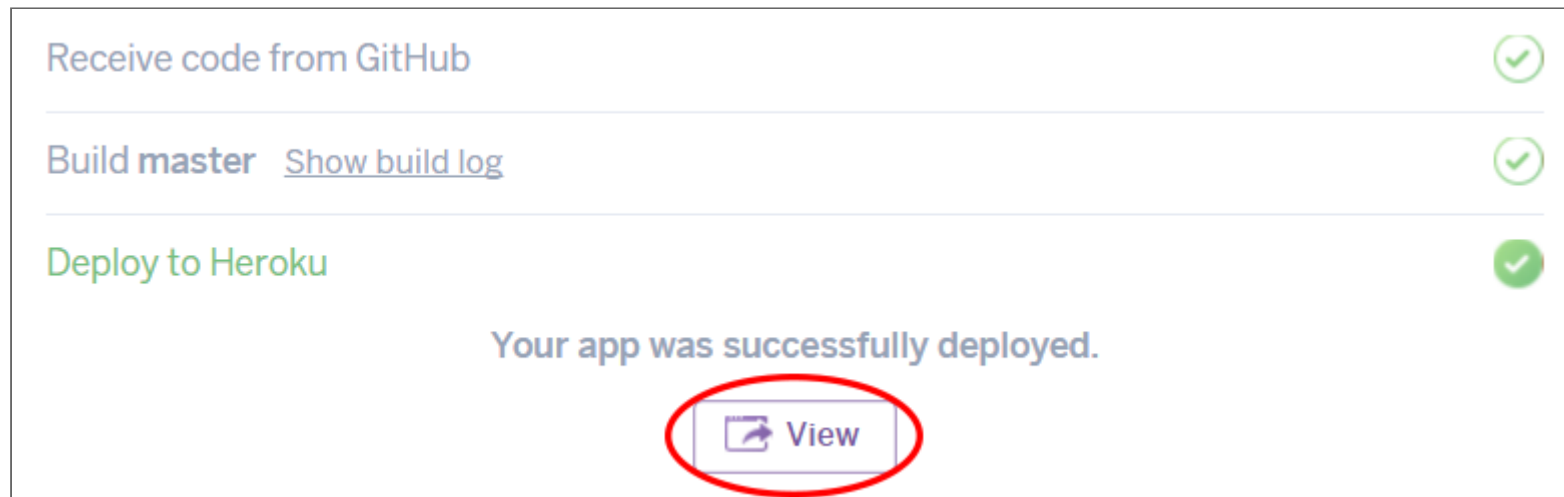
Now let's publish it live on Heroku:

3. Almost done! Next to "Manual Deploy", click "Deploy Branch" to make your app live on Heroku right now

Manual deploy Deploy the current state of a branch to this app.	Deploy a GitHub branch This will deploy the current state of the branch you specify below. Learn more. <div> master</div> <div>Deploy Branch</div>
---	---

Now let's publish it live on Heroku:

9. After a couple minutes, your app should be online! To try it out, click "View App" at the bottom



Congratulations!

Now you can share your first interactive app with the world!

Now let's tinker with it!

Check out more in the SocketIO docs: <http://socket.io/docs/>

[Sample Code](#)

[Slides](#)

By [Liz Krane](#) for [Learn to Code LA](#)