D3 Workshop

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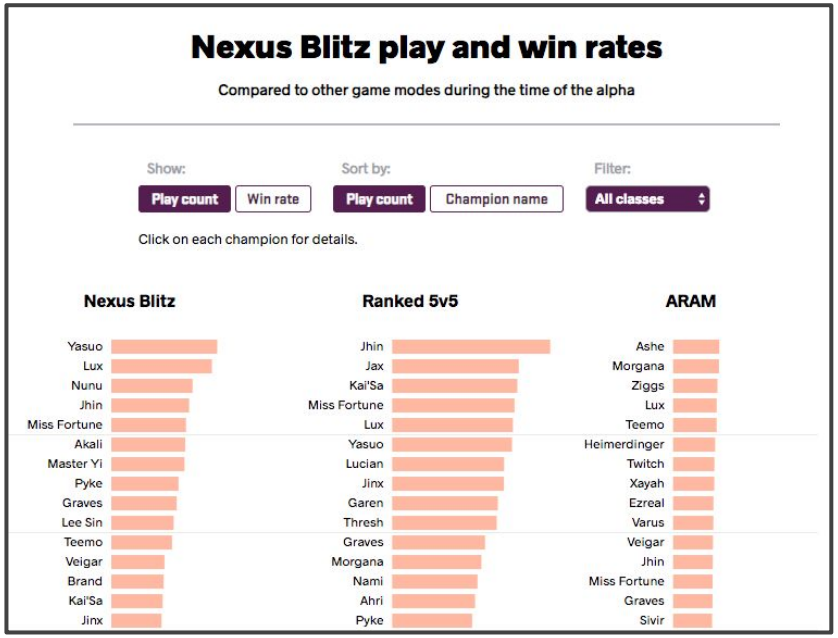
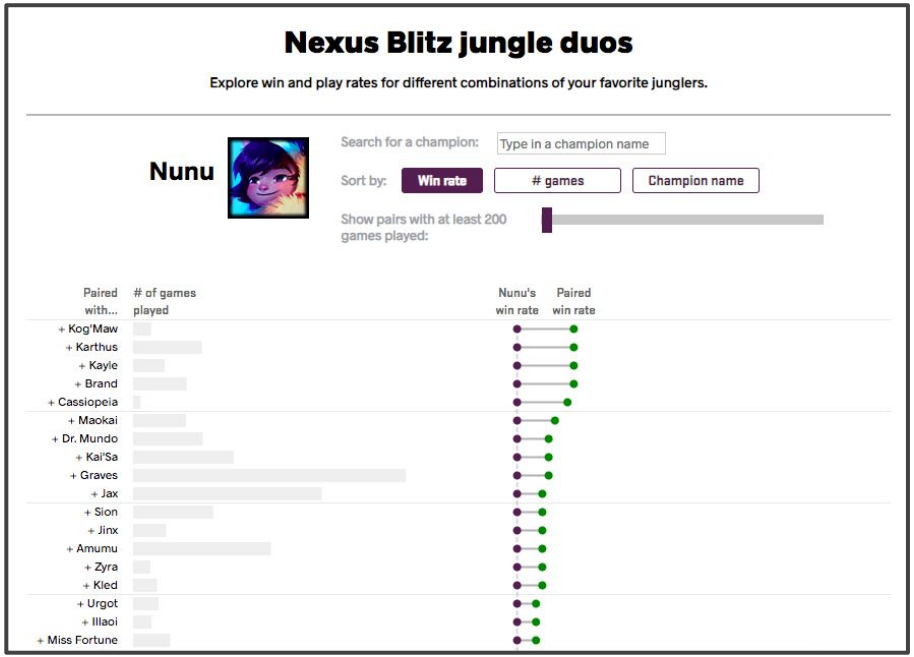
February 17, 2019

Examples of what you can create with D3





HTML, CSS & JavaScript

1) HTML

- Hypertext Markup Language
- A tool for specifying *semantic structure* of your content (i.e. attaching hierarchy and relationships)

Without structure:

How to create interactive data visualizations for the web You'll need the following: HTML CSS JavaScript

With structure:

How to create interactive data visualizations for the web

You'll need the following:

- HTML
- CSS
- JavaScript

Without structure:

How to create interactive data visualizations for the web You'll need the following: HTML CSS JavaScript

With structure:

How to create interactive data visualizations for the web

Headline

You'll need the following:

Paragraph text

- HTML
- CSS
- JavaScript

Unordered list with three items

2) CSS

- Cascading Style Sheets
- Used to style the visual presentation of your content

Without CSS styles:

How to create interactive data visualizations for the web

You'll need the following:

- HTML
- CSS
- JavaScript

With CSS styles:

How to create interactive data visualizations for the web

You'll need the following:

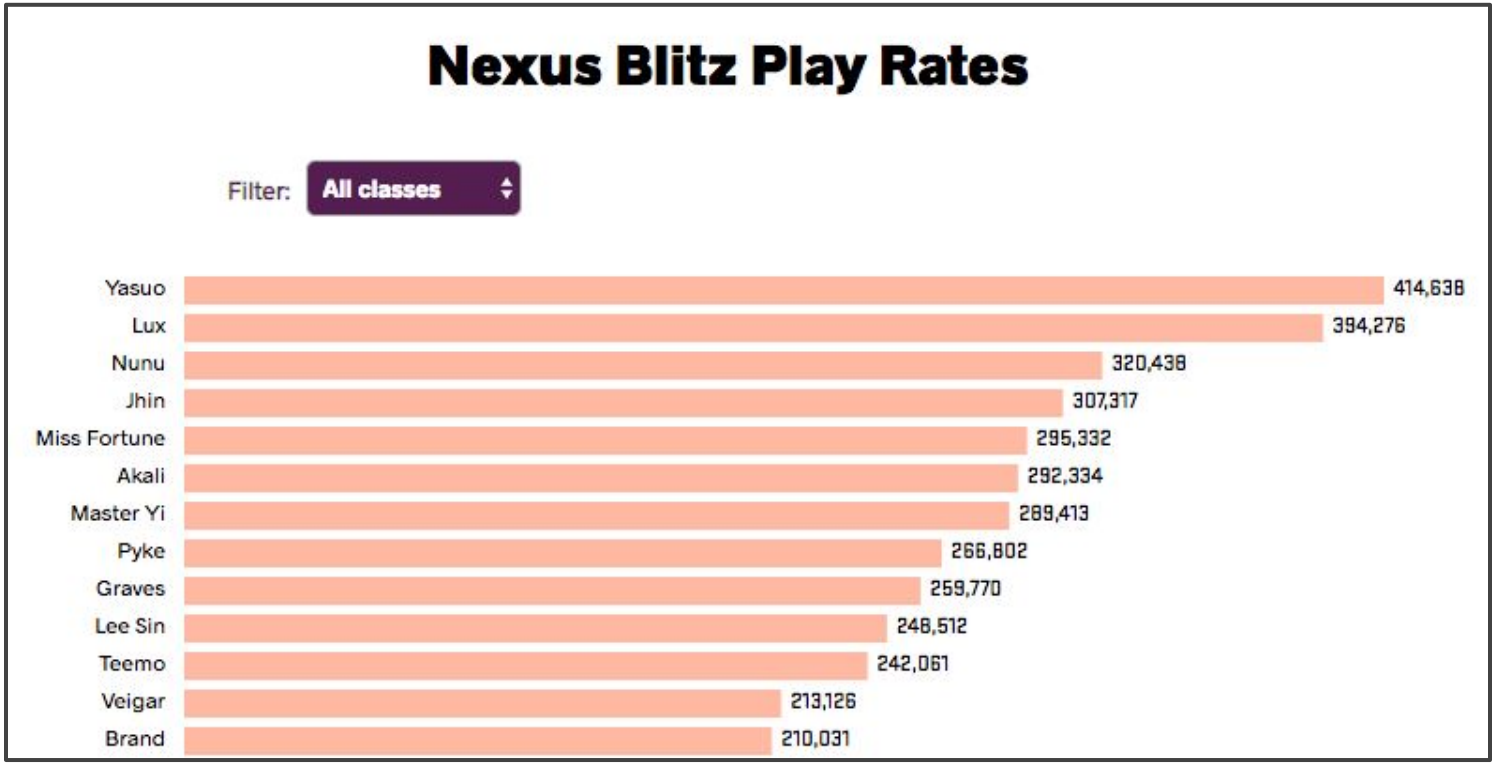
- HTML
- CSS
- JavaScript

3) JavaScript

- Scripting language that can make pages dynamic by manipulating your content (after a page has already loaded in your browser)

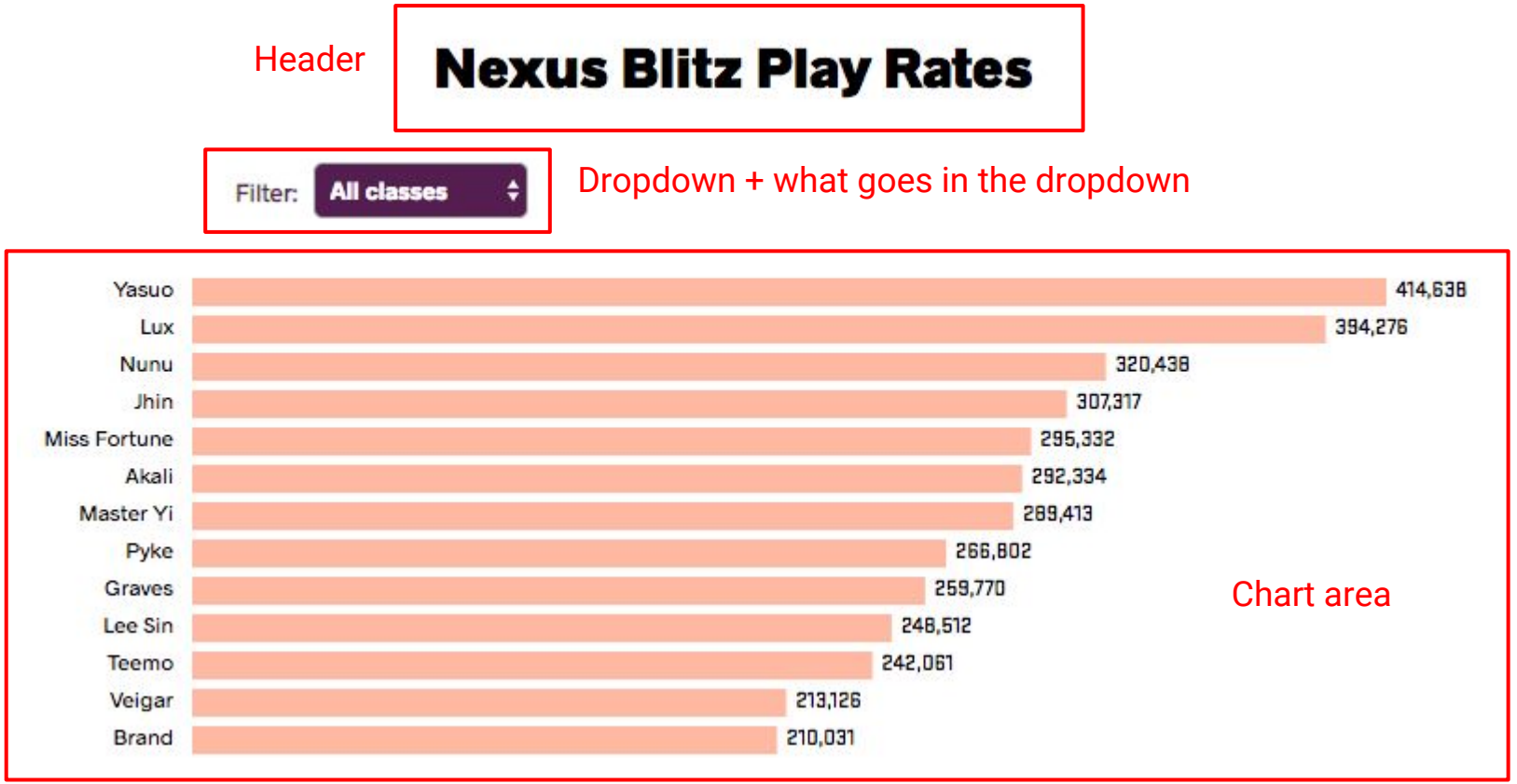
- Examples:
  - Mouseover
  - Click
  - Filtering

What we'll be creating today



What is HTML doing? Defining the elements on the page

Header

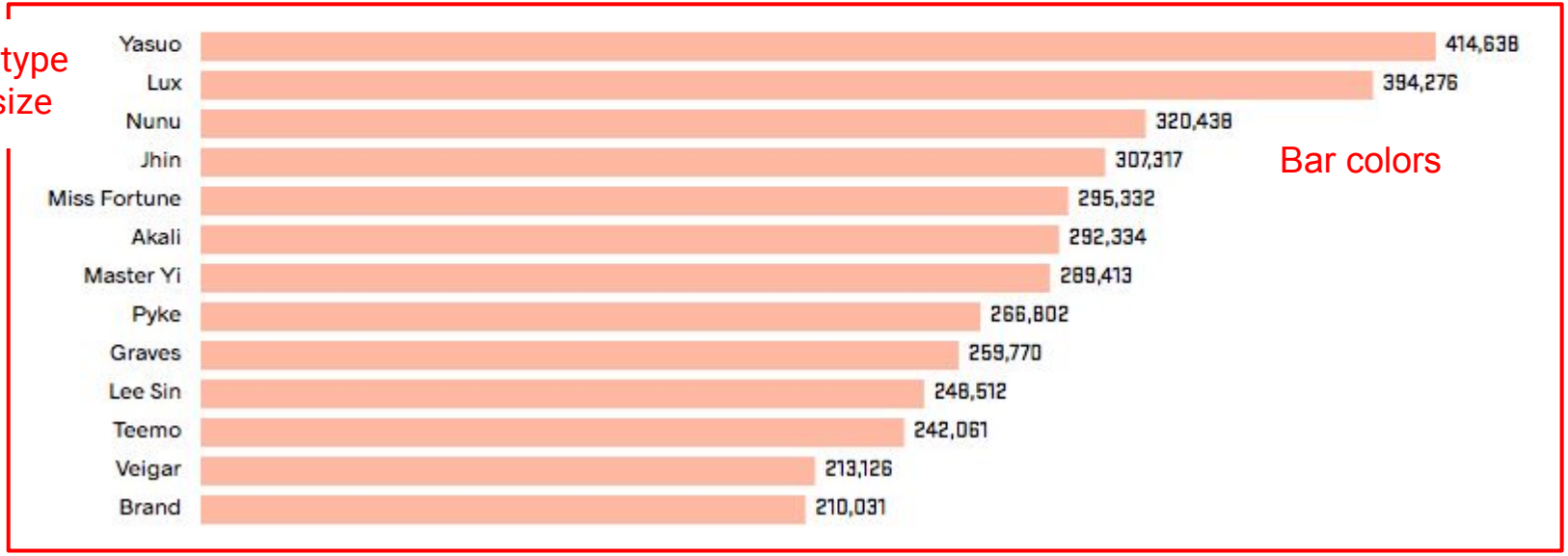


What is CSS doing? Defining the styles for each element

Font type, size, placement of text

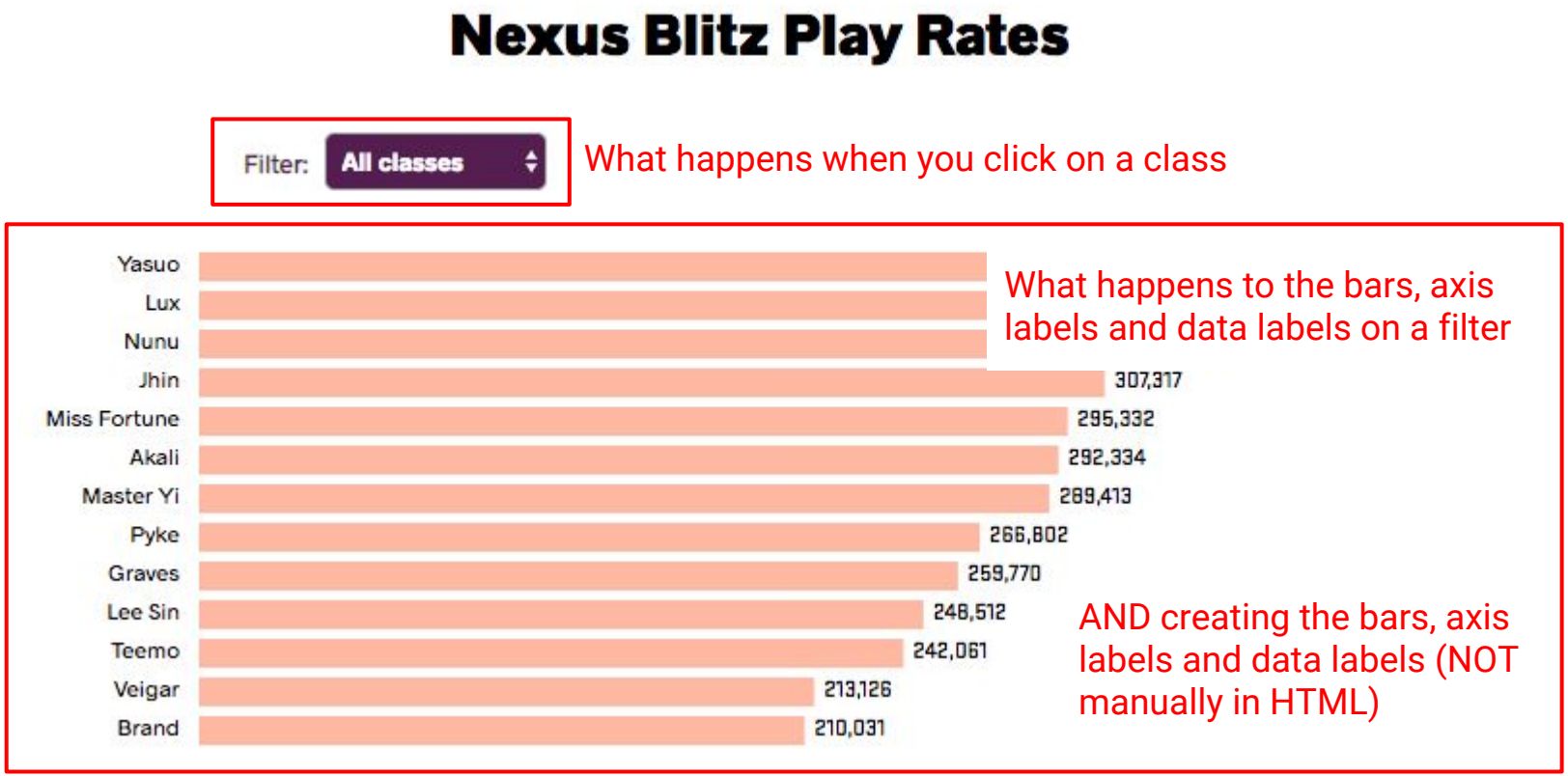
Width of dropdown, font type, size, background color

Font type and size



Bar colors

What is JavaScript doing? Defining how the page elements can change



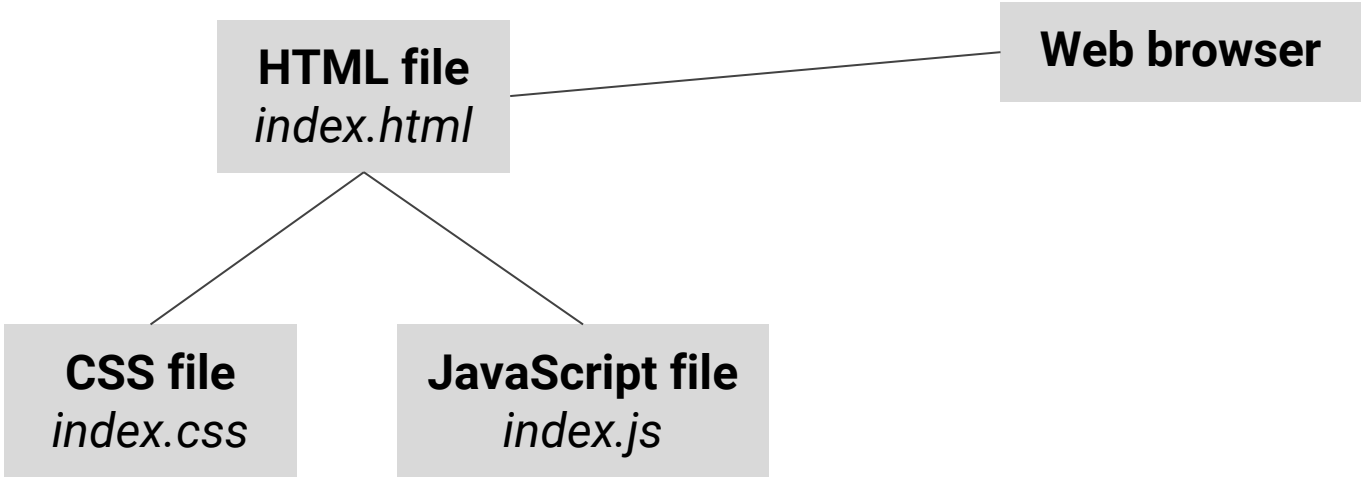
Putting it all together

HTML file

CSS file

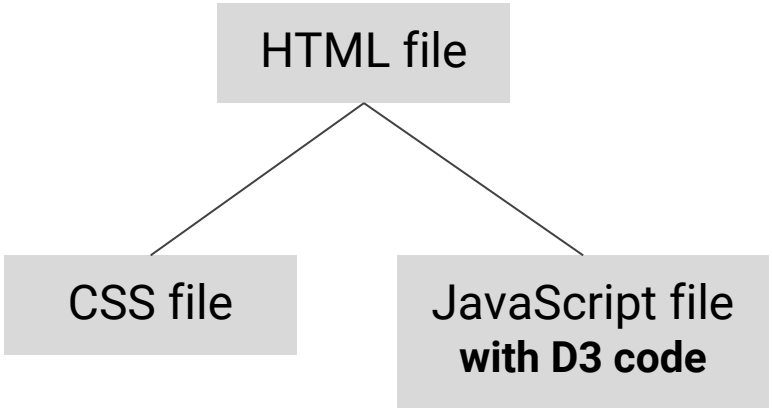
JavaScript file

Putting it all together

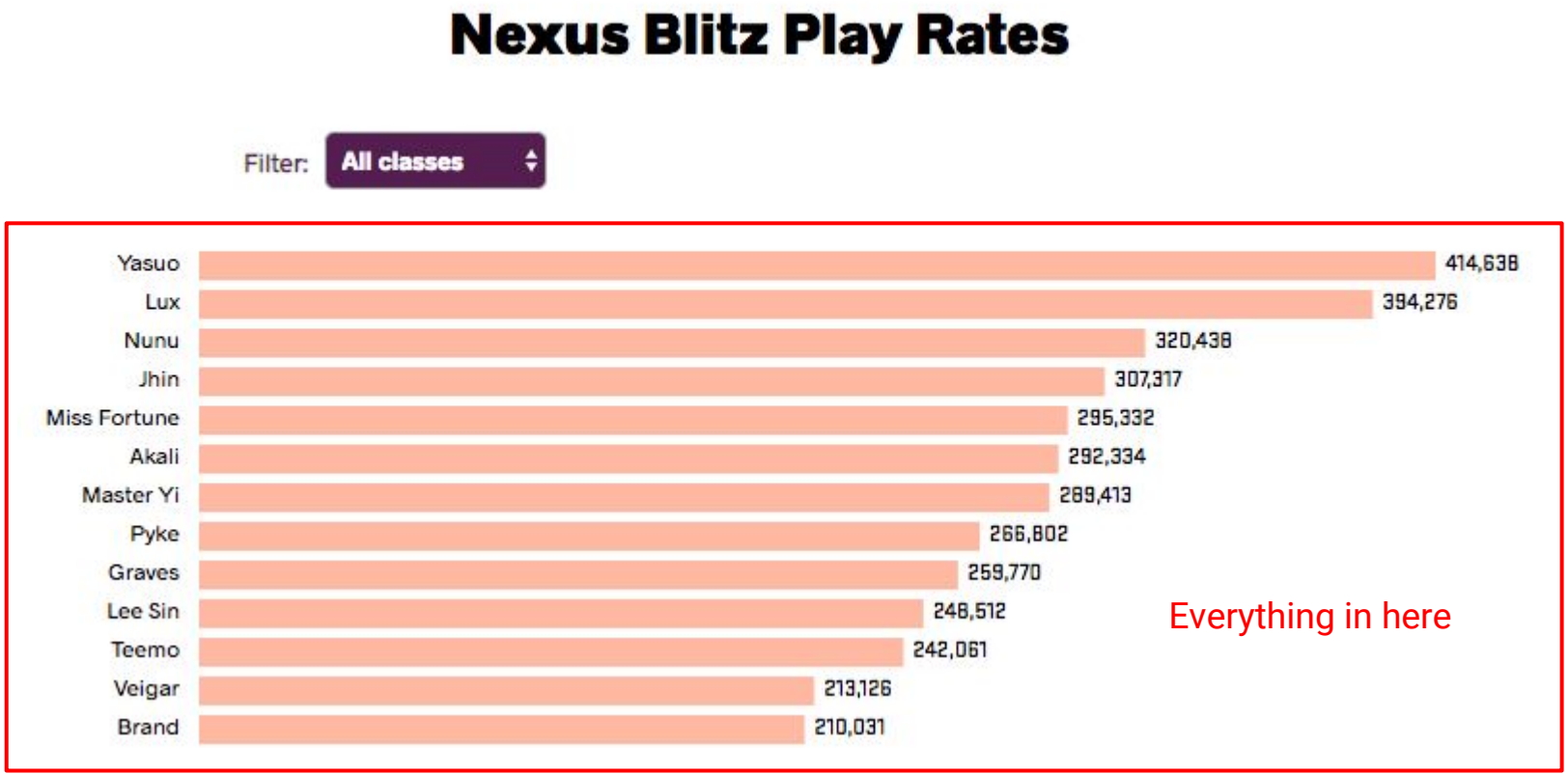


What about D3?

- D3 is a JavaScript library for loading data into a web page and generating visuals from that data



What is D3 doing? Everything in the chart area: creating the bars, axis labels, data labels AND manipulating all of these elements on a filter



Setup

General file structure

- Download GitHub repo: https://github.com/namisumida/d3-workshop

- Open up the ***template*** folder
  - index.html
  - index.js
  - CSS (folder)
    - index.css

Setting up a Python server

- Open a terminal window and navigate to the directory that you want served. For now, navigate to the ***template*** folder.
- For Python version 2.x, enter:

  python -m SimpleHTTPServer 8888

- For Python version 3.x, enter:

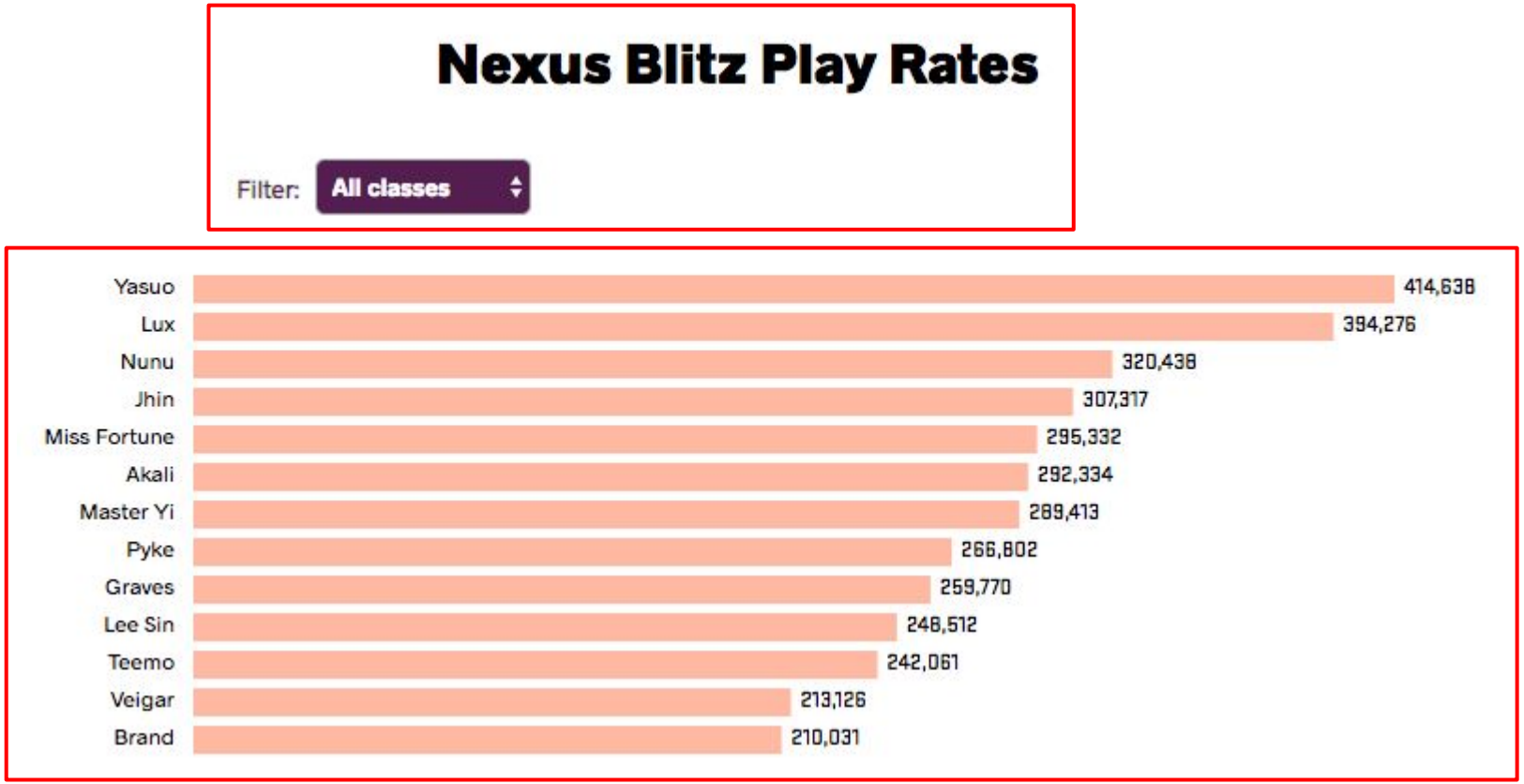
  python -m http.server 8888

- Switch to your web browser and enter the URL:

  http://localhost:8888/

Overview of how we'll create our data visualization

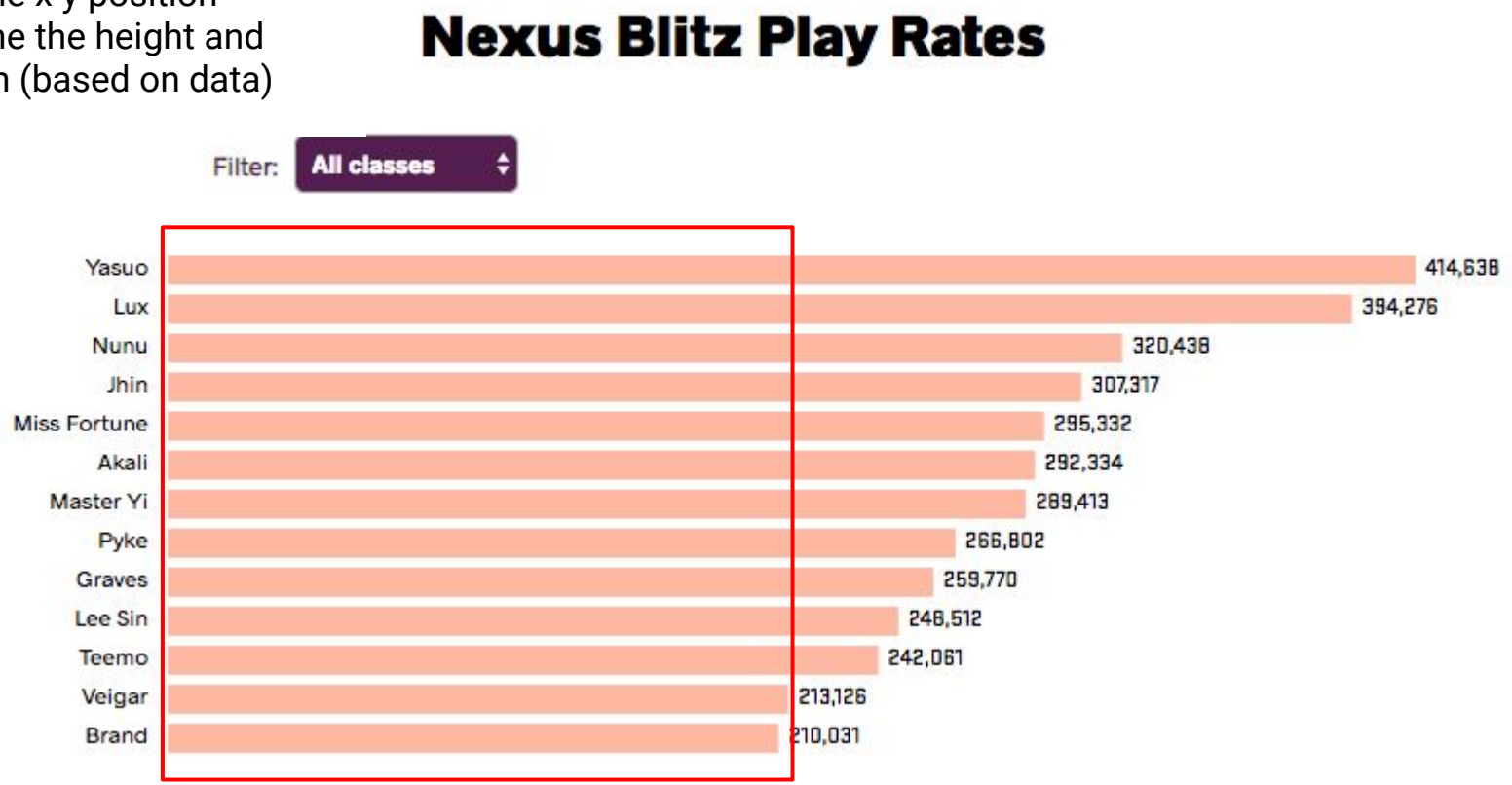
Step 1: Create the structure of the page using HTML



Step 2: Create bars

For each data point…

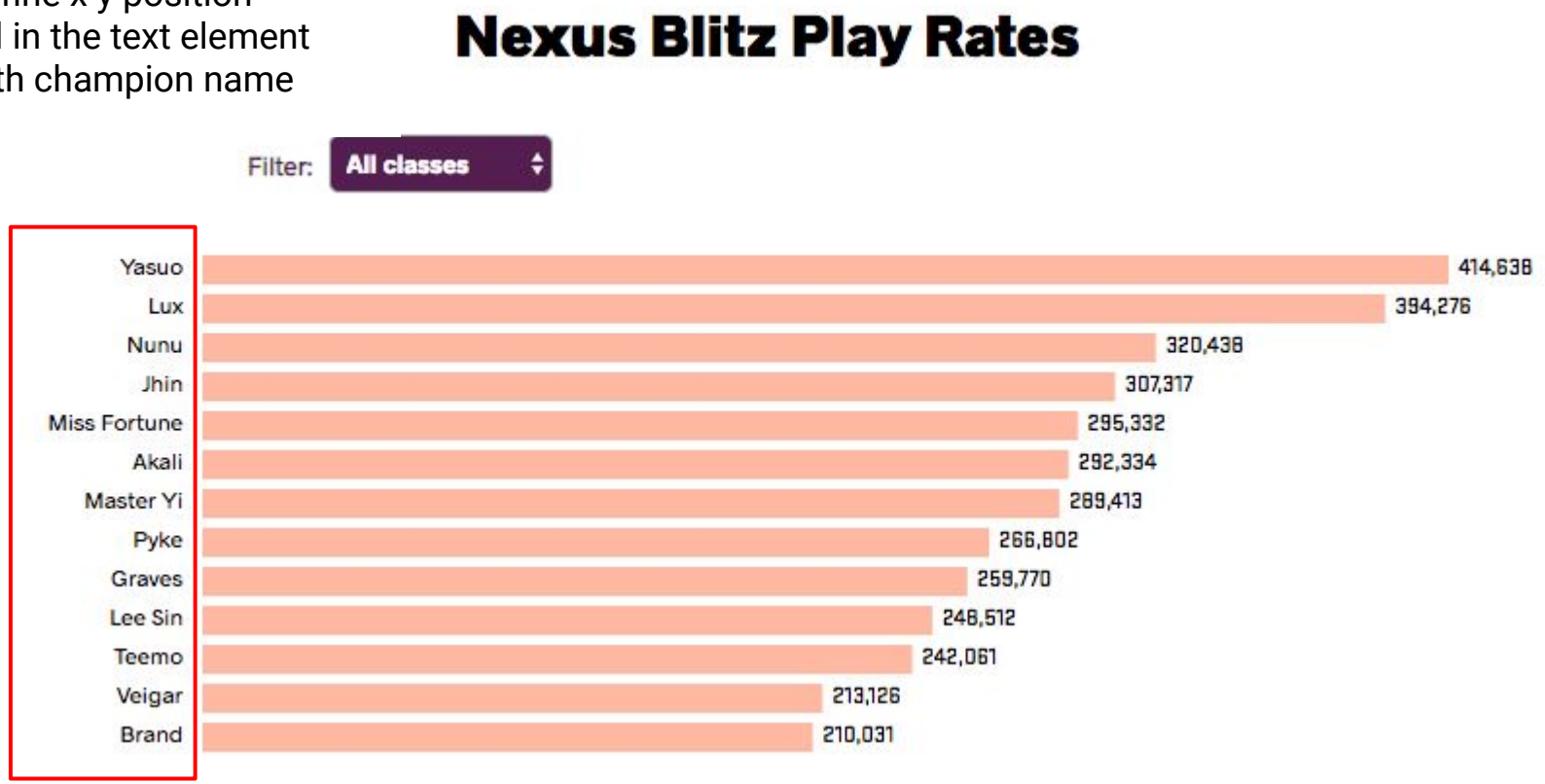
- Create a rectangle
- Define x y position
- Define the height and width (based on data)



Step 3: Create axis labels

For each data point…

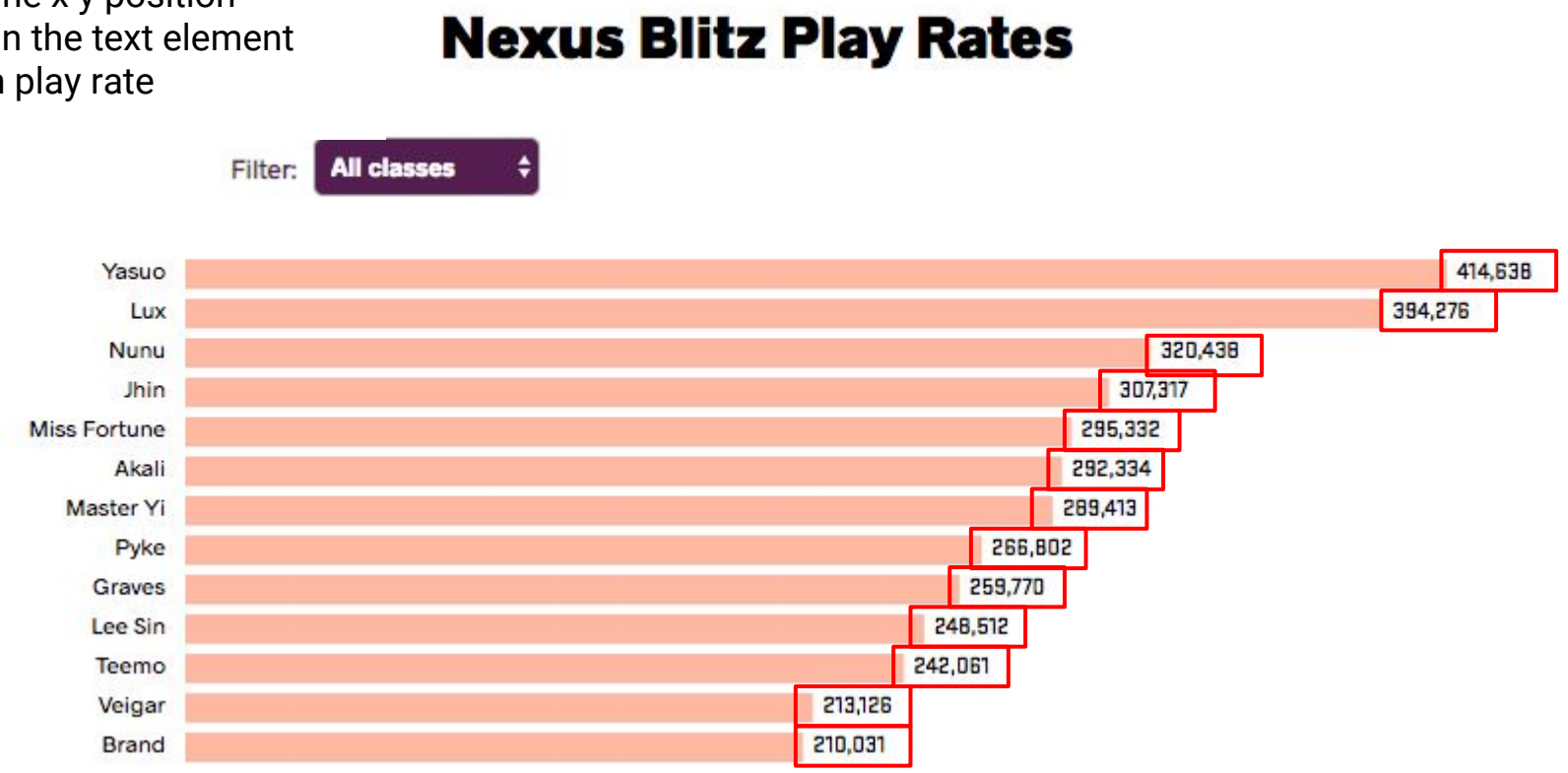
- Create a text element
- Define x y position
- Fill in the text element with champion name



Step 4: Create data labels

For each data point…

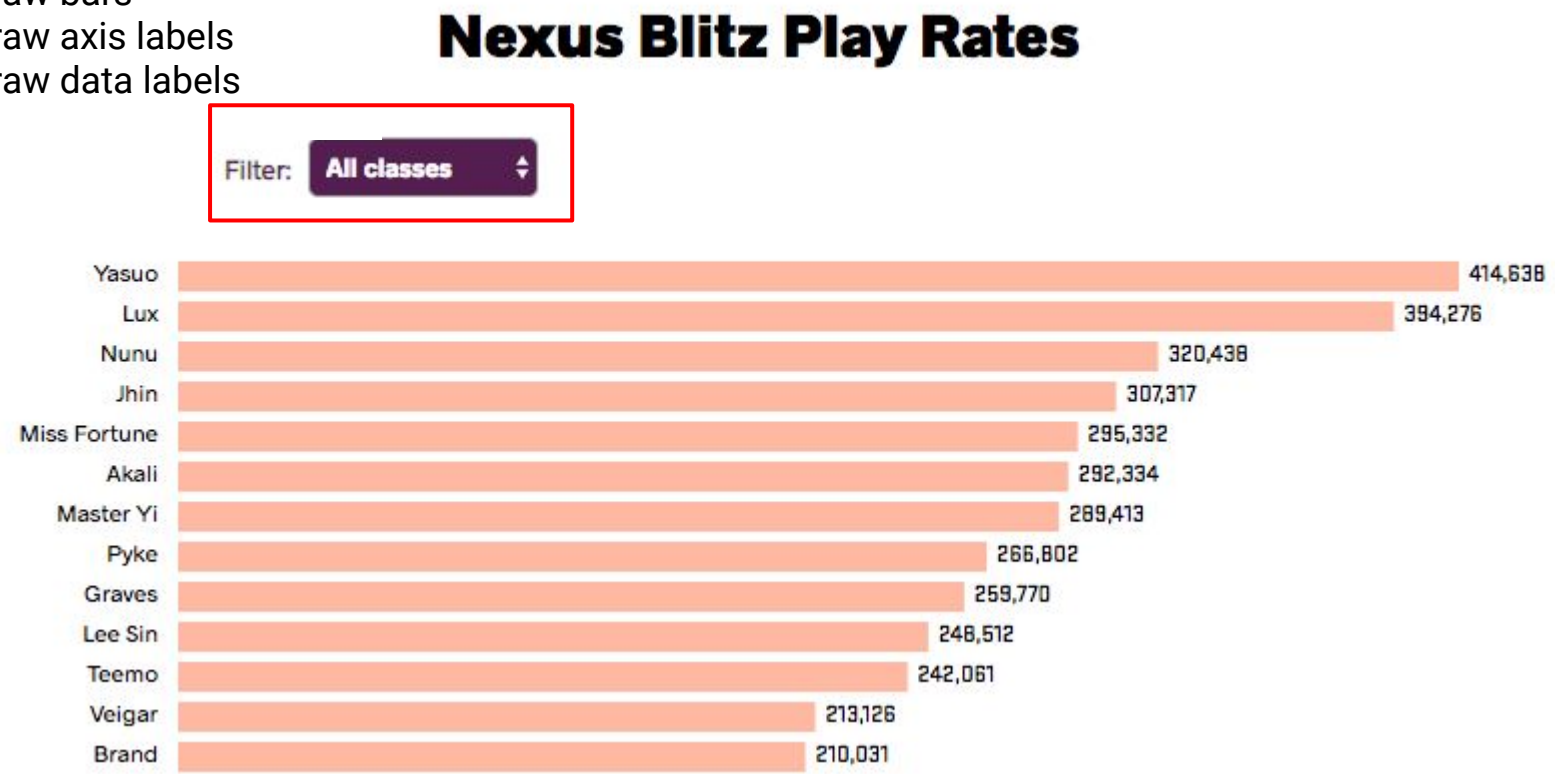
- Create a text element
- Define x y position
- Fill in the text element with play rate



Step 5: Filtering

For each filter/class…

- Filter the dataset
- Redraw bars
- Redraw axis labels
- Redraw data labels



Let’s start coding!

What is an SVG?

- Scalable Vector Graphics
- Most often used with D3
- SVGs are better than normal *div* elements since they’re more reliable, visually consistent and faster
- Think of it as a canvas for all your visuals

Chaining methods

- Chain syntax which allows you to “chain” methods together with periods to perform several actions in a single line of code
- Type in the following code:

```
svg.append(“text”).text(“My first text element!”);
```

- `svg`: refers to and returns our SVG element. We set that element to a variable called `svg` in line 1 of our JavaScript file

Chaining methods

- Chain syntax which allows you to “chain” methods together with periods to perform several actions in a single line of code
- Type in the following code:

```
svg.append(“text”).text(“My first text element!”);
```

- `.append()`: creates whatever new element you specify and appends it to your previous selection. It also hands off a reference to the new element it just created.

Chaining methods

- Chain syntax which allows you to “chain” methods together with periods to perform several actions in a single line of code
- Type in the following code:

```
svg.append(“text”).text(“My first text element!”);
```

- `.text()`: takes a string and inserts it as the text that will be displayed in this text element

Setting attributes

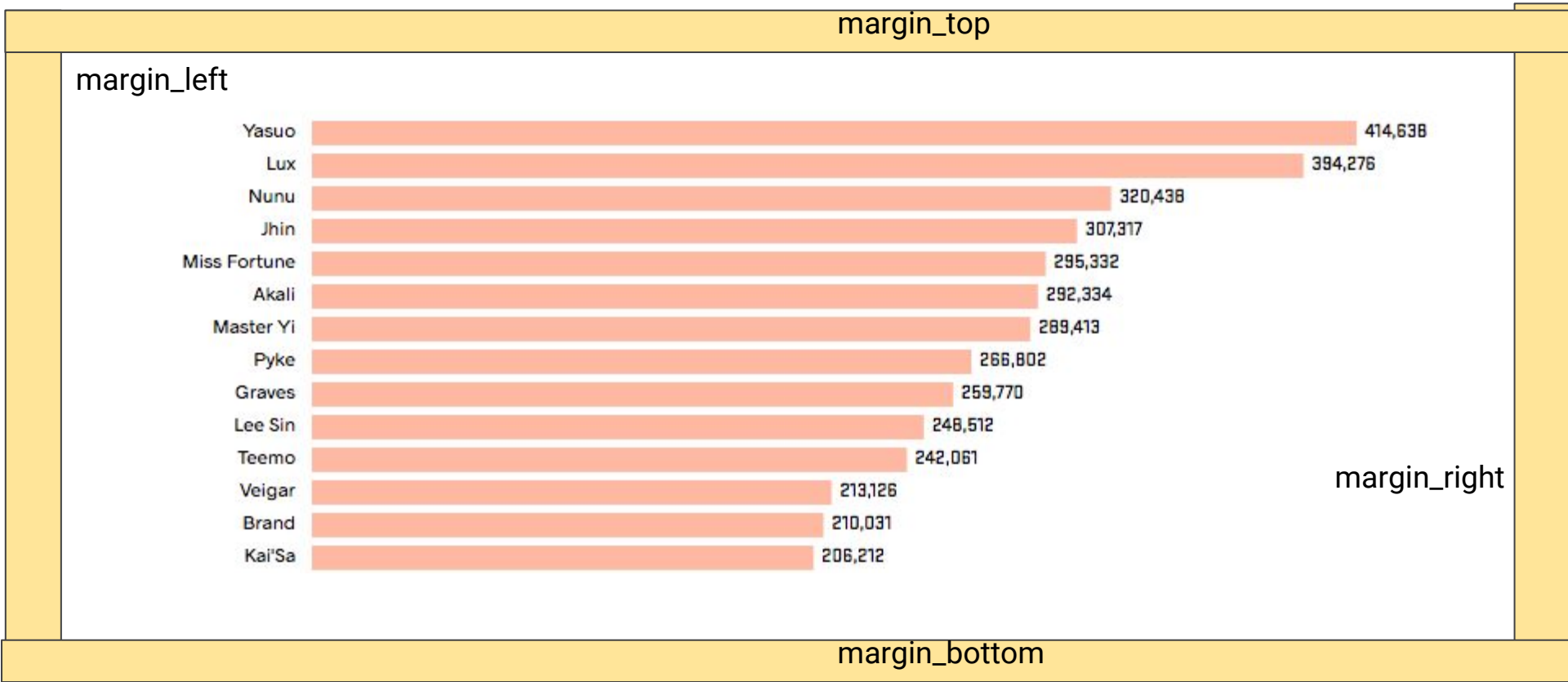
```
svg.append(“text”)
    .text(“My first text element!”)
    .attr(“x”, 30)
    .attr(“y”, 10);
```

- `.attr()`: sets an HTML attribute and value on an element
- Here, we’re setting the `x` position of the text element to `30 pixels` and the `y` position to `30 pixels`.
- On a webpage, the point `(0,0)` is the top-left corner of the page

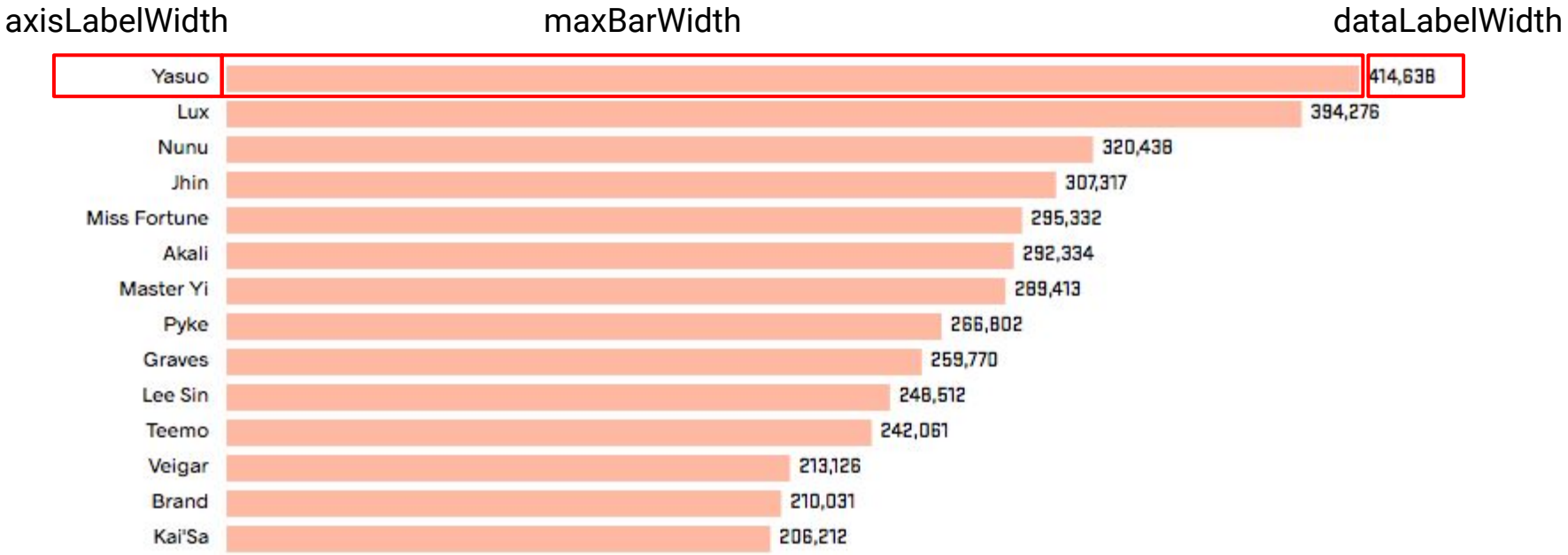
Other attributes

- ID (unique name of an element)
- Class (group that an element belongs to)
- Width/height

Planning the chart: margins



Planning the chart: determining max width of elements



Creating an x scale for bar widths

```
var xScale = d3.scaleLinear()
                .domain([minDomain, maxDomain])
                .range([minRange, maxRange]);
```

- A function that will take input values and output a range of values
- In our case, input values are our data values and output values are bar widths

Creating an x scale for bar widths

```
var xScale = d3.scaleLinear()
                .domain([minDomain, maxDomain])
                .range([minRange, maxRange]);
```

- Your input values
- You'll typically use the minimum and maximum values of the data you're visualizing

Creating an x scale for bar widths

```
var xScale = d3.scaleLinear()
                .domain([minDomain, maxDomain])
                .range([minRange, maxRange]);
```

- Output range
- For our bar chart, think of the smallest bar width you want to use and the widest bar width (maxBarWidth variable)

Creating bars

```
svg.selectAll("myBars")
    .data(dataset)
    .enter()
    .append("rect");
```

- Start with svg because that’s where we want these bars to go into
- Selecting all elements on the page that are of type “myBars”. None exist right now, but they will soon in the next line

Creating bars

```
svg.selectAll("myBars")
    .data(dataset)
    .enter()
    .append("rect");
```

- Parses data values and binds our elements with data values
- Everything past this point is going to be executed for each data value

Creating bars

```
svg.selectAll("myBars")
    .data(dataset)
    .enter()
    .append("rect");
```

- Creates new, data-bound elements
- This method looks at the “myBars” elements that are being selected, compares them to the dataset being called. If there are more data values than corresponding elements, then `enter()` creates new elements for them.

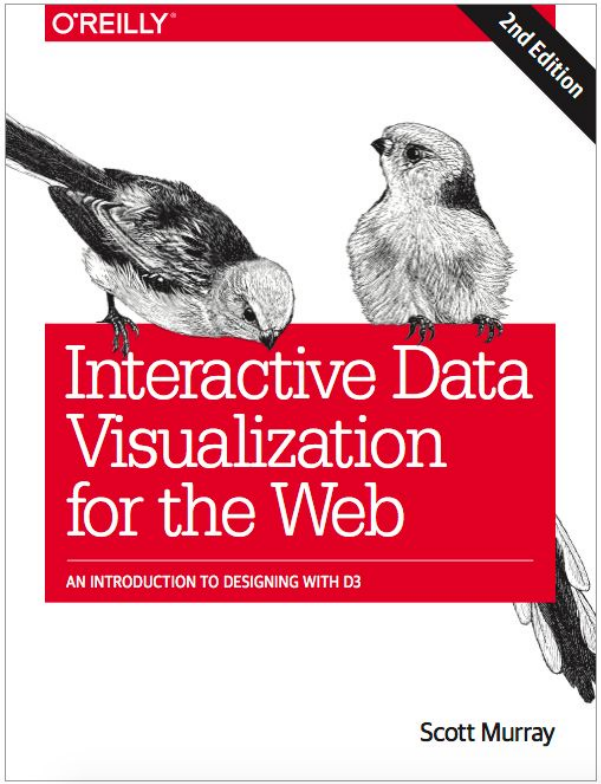
Creating bars

```
svg.selectAll("myBars")
    .data(dataset)
    .enter()
    .append("rect");
```

- Specifies what type of element you want appended
- In our case, we want rectangles

Resources

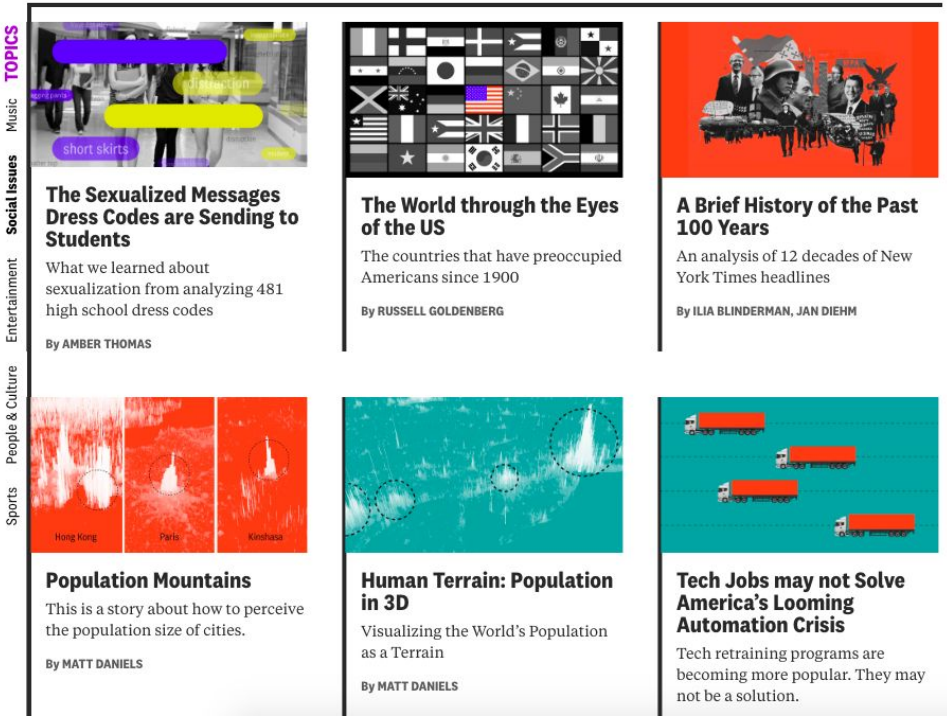
Resources



For learning D3:

Interactive Data Visualization for the Web by Scott Murray

Resources



For inspiration & learning tricks/tools (once you've learned/mastered D3):

The Pudding (www.pudding.cool)