**D3 – Data Visualization**

# **Exercise – D3**

**Student Name: Student Id:**

**Date:**

Please use the screenshots ONLY as a reference. The written instructions have to be followed AS written.

### Objective:

The objective of this exercise is to visualize university’s food data using D3

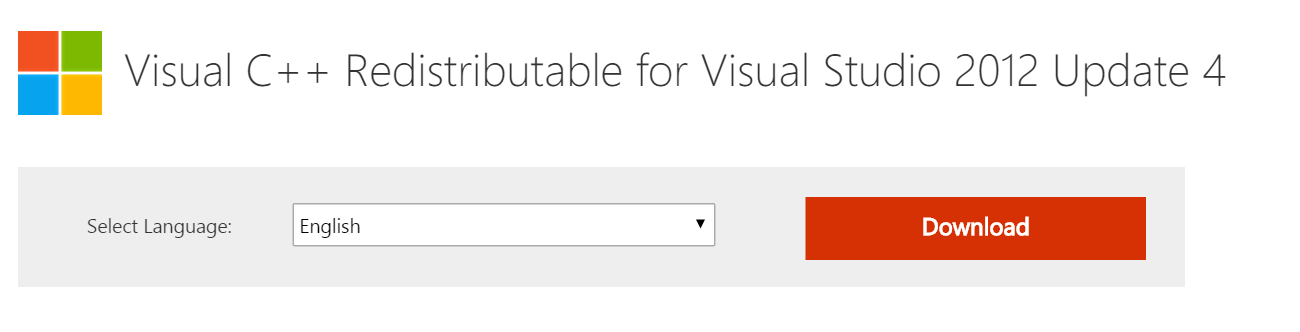
**Prerequisites:**

1. Install Local server
   1. Install **Wampserver** for **windows**:

Prerequisites of installing “**wampserver**”**:**

Install **Visual C++ 2012 Redistributable** for **windows users**

<http://www.microsoft.com/en-us/download/details.aspx?id=30679>



Once visual C++ 2013 redistributable is installed, **install** **WampServer**:

WampServer is a web development environment which allows you to create web applications. It installs local server environment on your windows system.

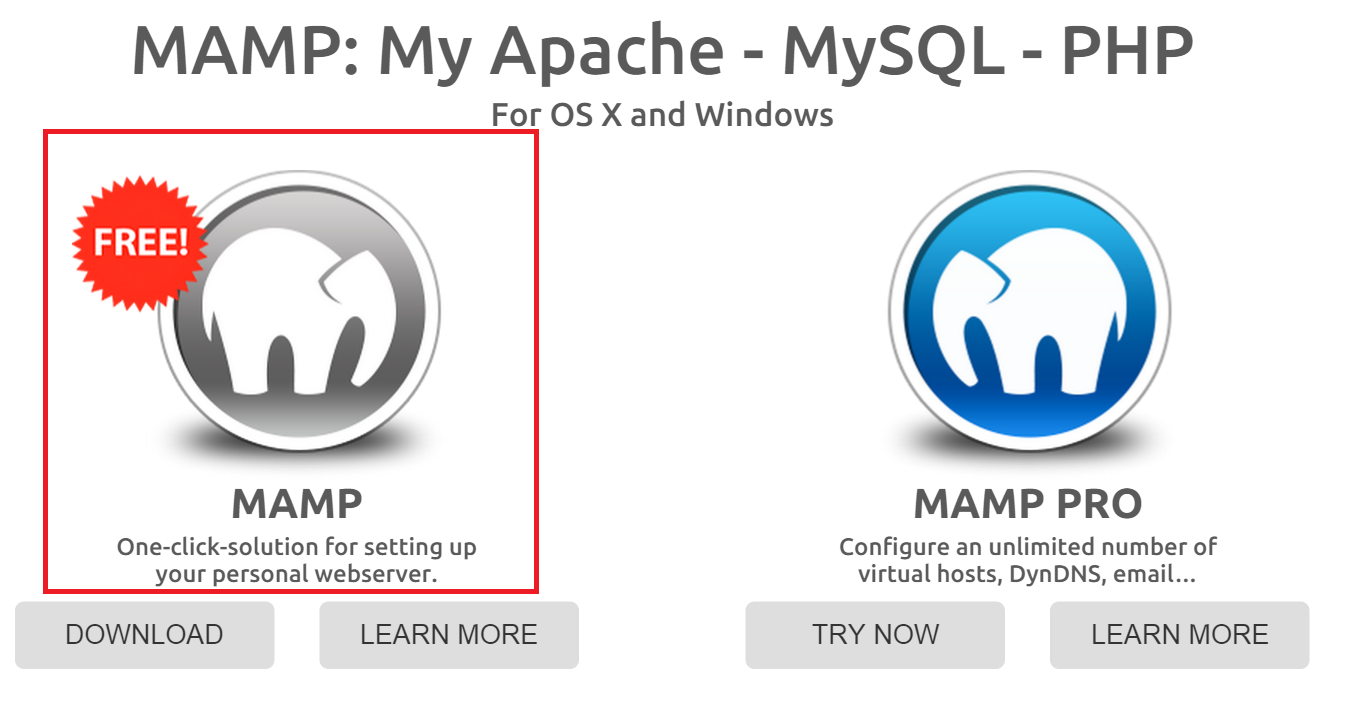
<http://www.wampserver.com/en/#download-wrapper>



* 1. **Install MampServer for Mac:**

Installs local server environment on your Mac system.

<https://www.mamp.info/en/>



1. Install Eclipse

**Prerequisite for installing Eclipse**

Install Latest version of Java

<http://www.oracle.com/technetwork/java/javase/downloads/jdk8-downloads-2133151.html>



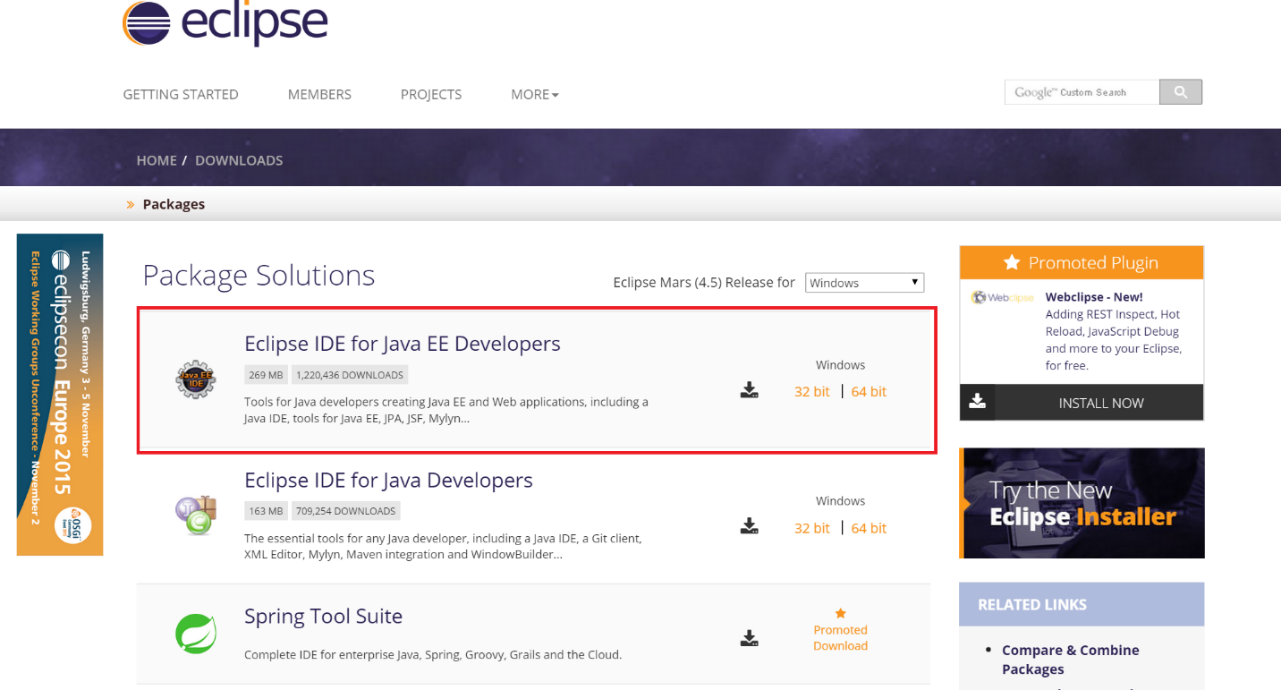
After you have successfully installed Java, **Install Eclipse**

**Windows:**

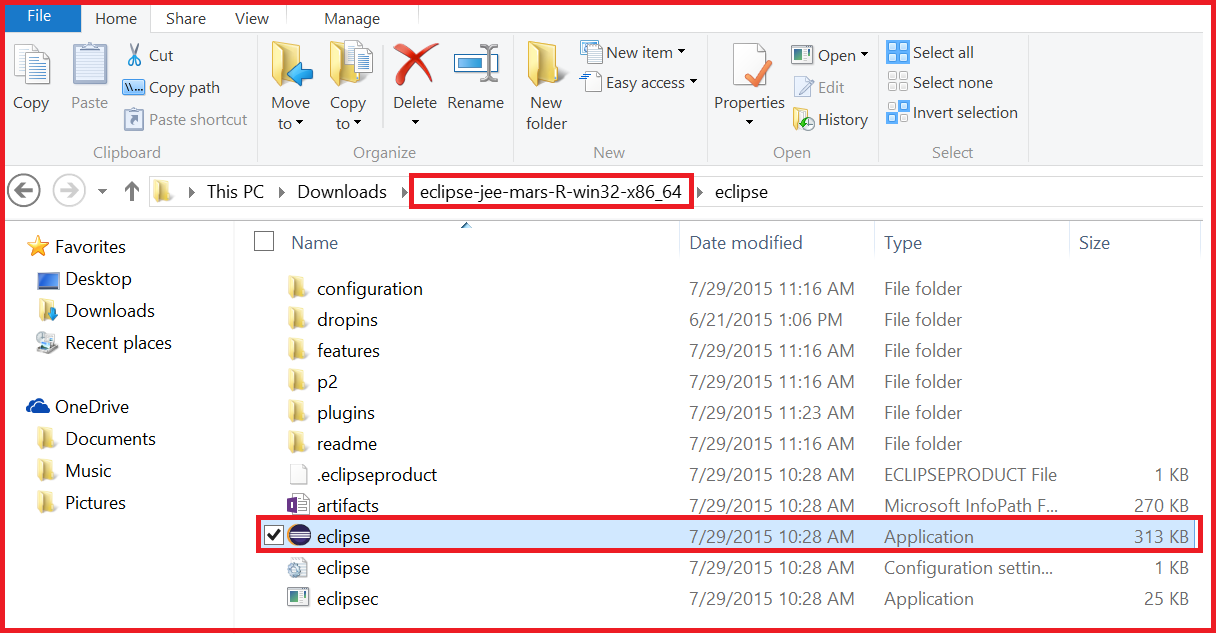
<http://www.eclipse.org/downloads/>

**Mac:**

<https://www.eclipse.org/downloads/?osType=macosx>



After installing eclipse, extract the eclipse folder. In order to open eclipse open the extracted folder and double click on the eclipse icon.

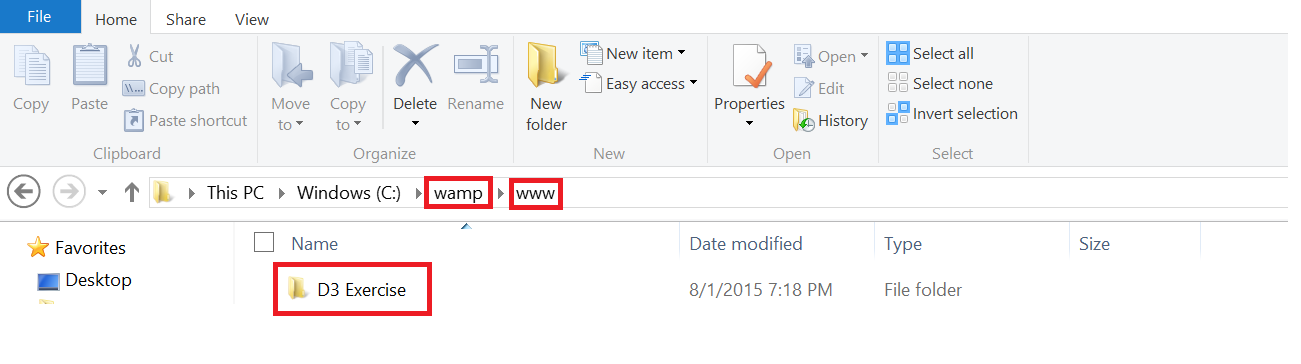


**Step 1: Download the provided CSV files from eLearning**

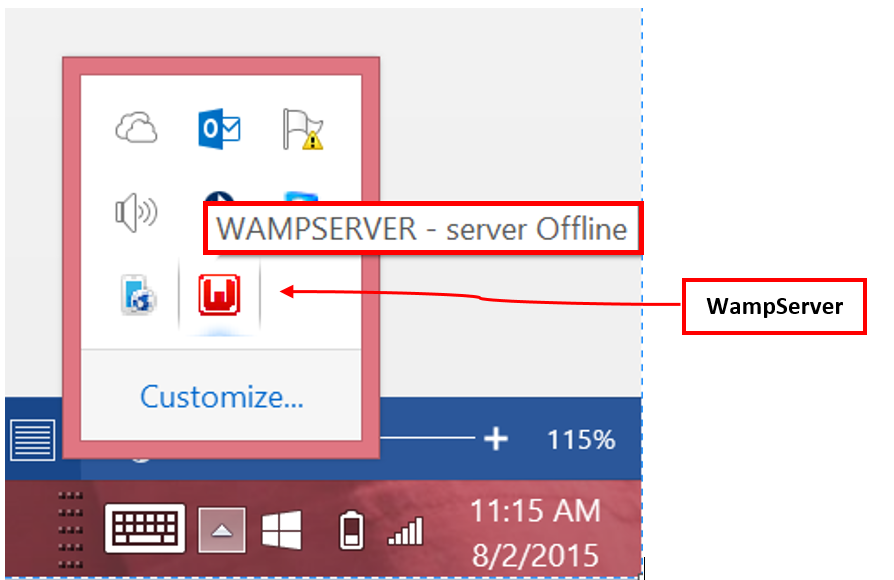
**Step 2: Setting up Local Server**

**Step 2.1: Setting up the WampServer for windows**

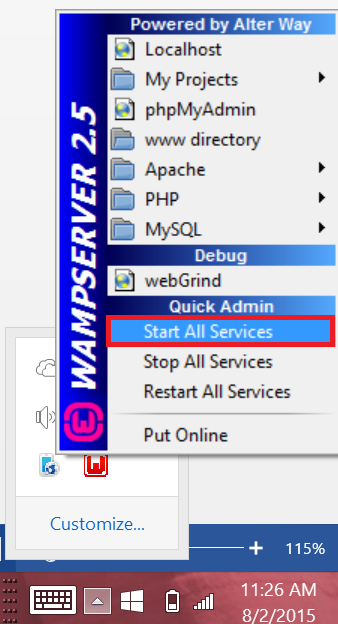
After installing the WampServer. Search for the “**Wamp**” folder in your C:/ drive or the location where you had saved it. Double click on the “**Wamp**” folder, double click on the “**www**” folder. Within this folder we will be creating our eclipse workspace so that all the HTML documents that we create are already available in the server.

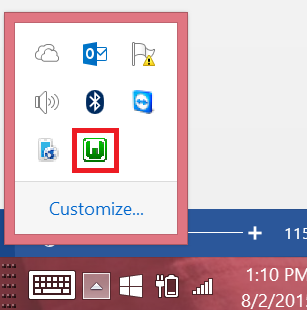


Open the wampserver. After opening the wampserver it will be visible in the desktop tray. At first you will notice that the wampserver icon will be in red which means that it is not active and at this stage if you open your webpages from the local server you will not be able to view them using the local server.



In order to display webpages using the local server we need to start the server. Click on the WampServer icon in the desktop tray and then click on **“Start All Services”.** This will make the WampServer icon to turn green which means now you can you’re your HTML documents and view them in the browser using our local host.

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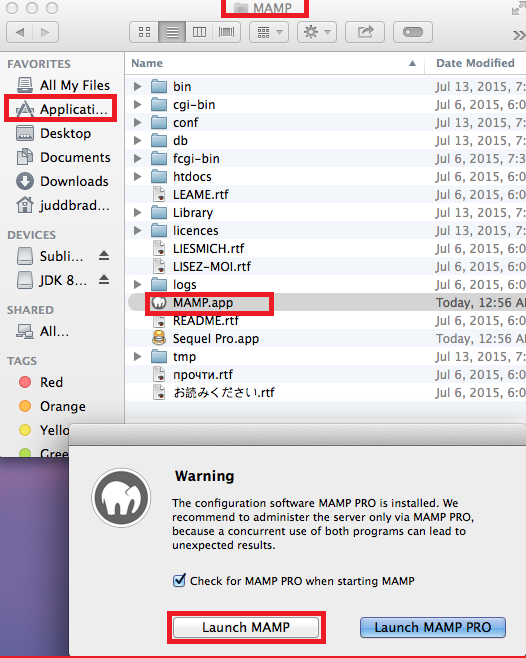
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**Step 2.2: Setting up Mamp server for Mac**

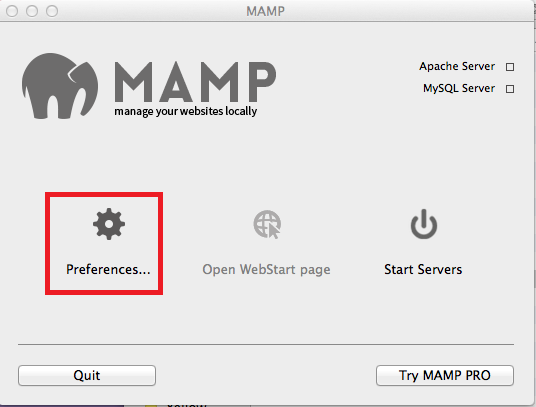
After downloading the mamp server, install the mamp server by going to downloads folder and double click on the mamp file.

In the desktop create a new folder named **“localhost”**

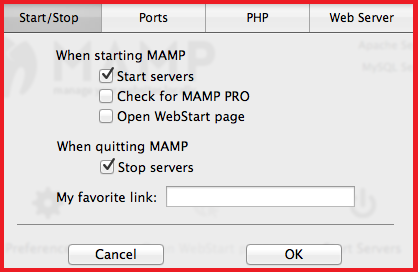
After installing, go to the applications folder, double click on the mamp folder and then double click on mamp.app. A popup appears, click on **Launch MAMP.**



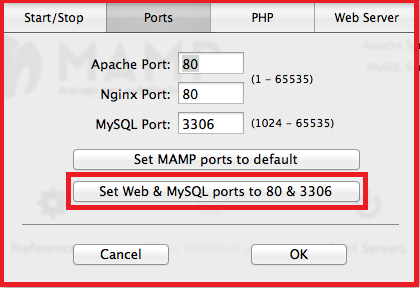
Another popup appears click on **preferences,**

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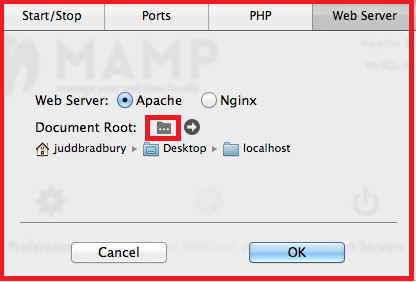
A new popup appears having 4 tabs. In the **Start/ stop** tab



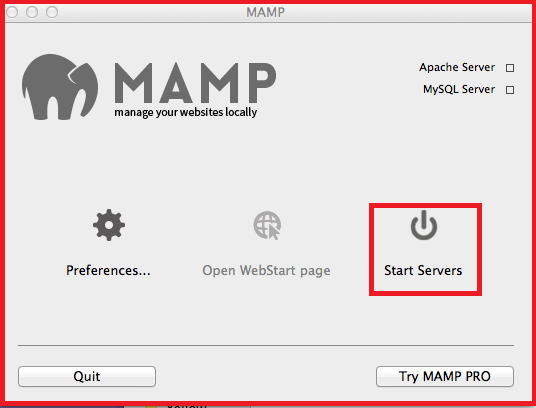
In the **ports tab,** click on the button highlighted below.



In the web server tab, select the folder icon highlighted below and then select the **localhost folder** created in the desktop.



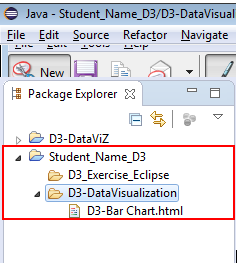
Once these settings are double click on the **Mamp.app** again under **applications** folder. In the popup, click on **“Start Servers”** in order to view your web pages in the local server.



You can also stop the server by following the same steps.

**Step 1: Create a new folder and HTML file**

* In eclipse open a new project Student\_Name\_D3
* Create a new folder‘D3-Data Visualization’ inside this project
* Create a new HTML file ‘D3-Bar Chart’inside this folder



**Step 2: Download dataset from ELearning**

* Download the ‘University\_Food\_Data.CSV’ file from eLearning and save it in above created folder. To access D3-Data Visualization folder go to your ‘wamp’ folder-> www->D3-Data Visualization



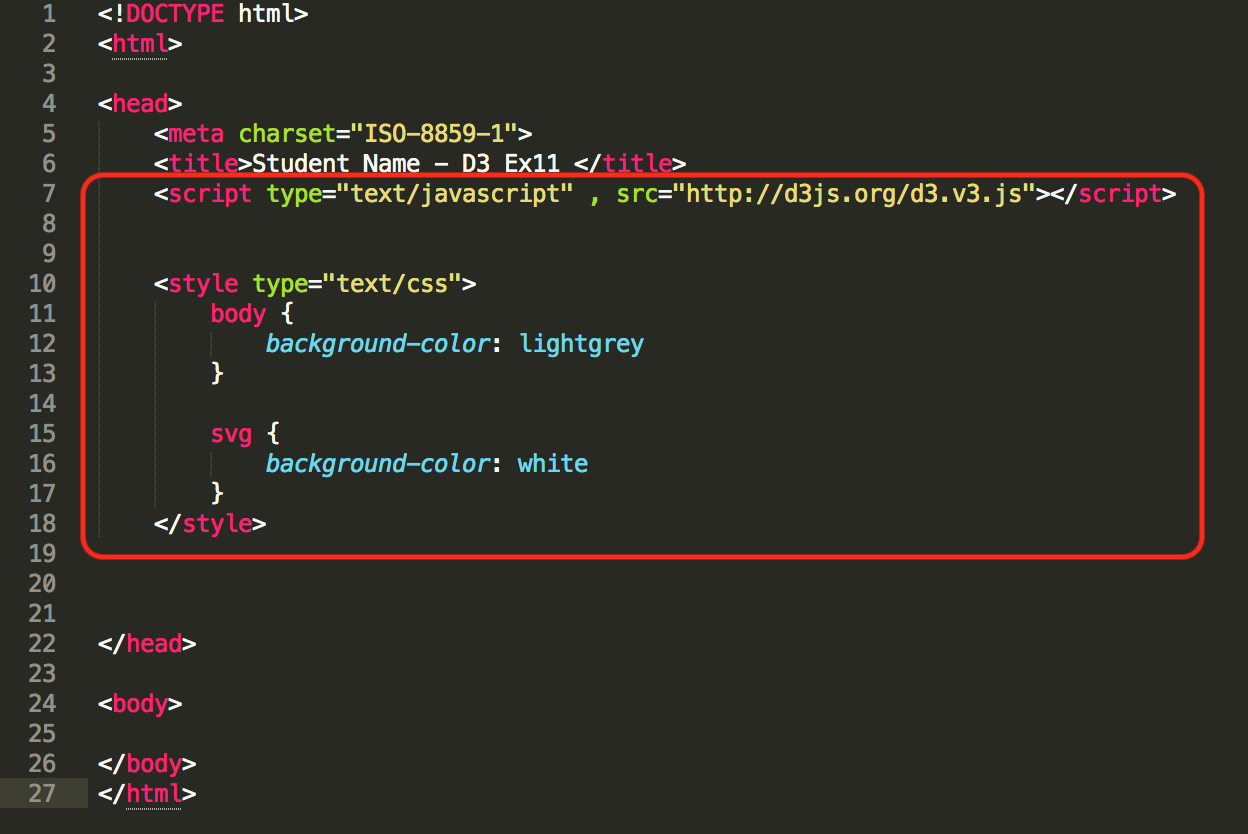
* Get top three selling menu items for each store
  + Open downloaded csv file
  + Create a new csv file
  + Copy column header from downloaded csv to newly created csv
  + In downloaded csv sort data by Gross\_sales (largest to smallest) and Store\_Name (A to Z)
  + There are 9 different stores in dataset, apply filter on Store\_Name and for each store get top 3 items by gross sales and copy it into newly created csv file. For example in filter value of Store\_Name select ‘Coffee Corner’ and get top 3 items by gross sales and copy it into new csv
  + After completing above step for all 9 stores, you will have 28 records in new csv, 1 header record and 27 other records, save newly created csv file as food\_court filtered data.csv

**Step 3: Create CSS**

* On creating new html file in eclipse you will get below HTML file template



* Make following changes to this template
  + Change title to ‘Student\_Name- D3 Viz’
  + Load D3 library and create CSS style for page’s background color and svg’s background color:



**Code Explanation**:

* + - Adding title using title tag
    - Loading D3 library usinglink ‘http://d3js.org/d3.v3.js’so that D3 functions can be used in this HTML page
    - Using style tag setting css style for body background and svg background color

**Question:**

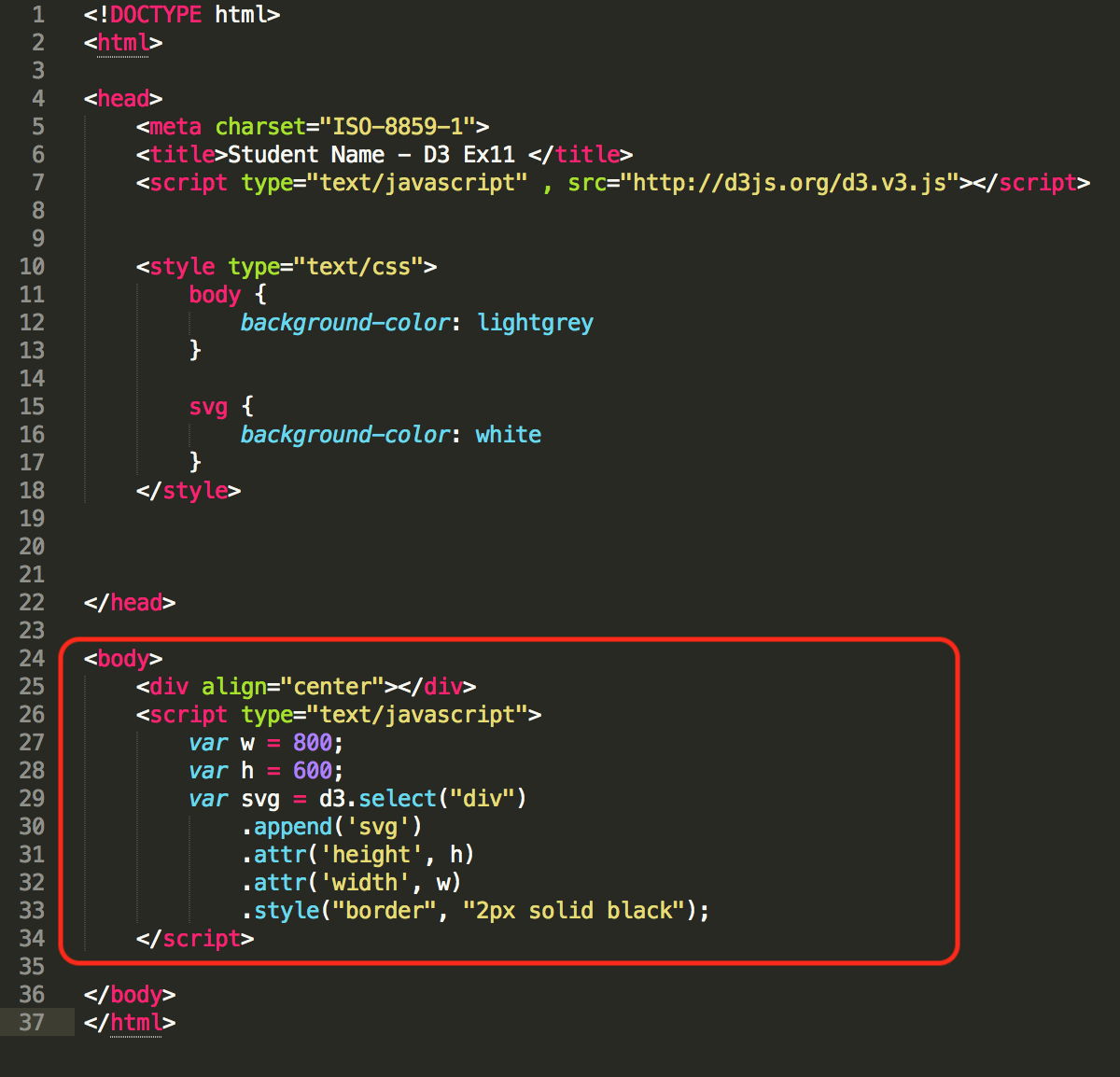
1. **Open your HTML page in WEB browser and take a screen shot of your page showing page Title (your name) and page background**

**Answer**

**----------------------------------------------------------------------------------------------------**

**Step 4: Create a division and SVG image**

* Add a center aligned division and SVG image in your HTML page

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**Code Explanation**:

* + Create a svg frame and assign it to the variable svg.
  + Use the function d3.select to find the div tags present in the body. There is only one div tag present in the body.
  + Append the svg frame in the div tag and set the attribute such as height and width of the svg frame as mentioned in the variable "v" and "h".

**Question:**

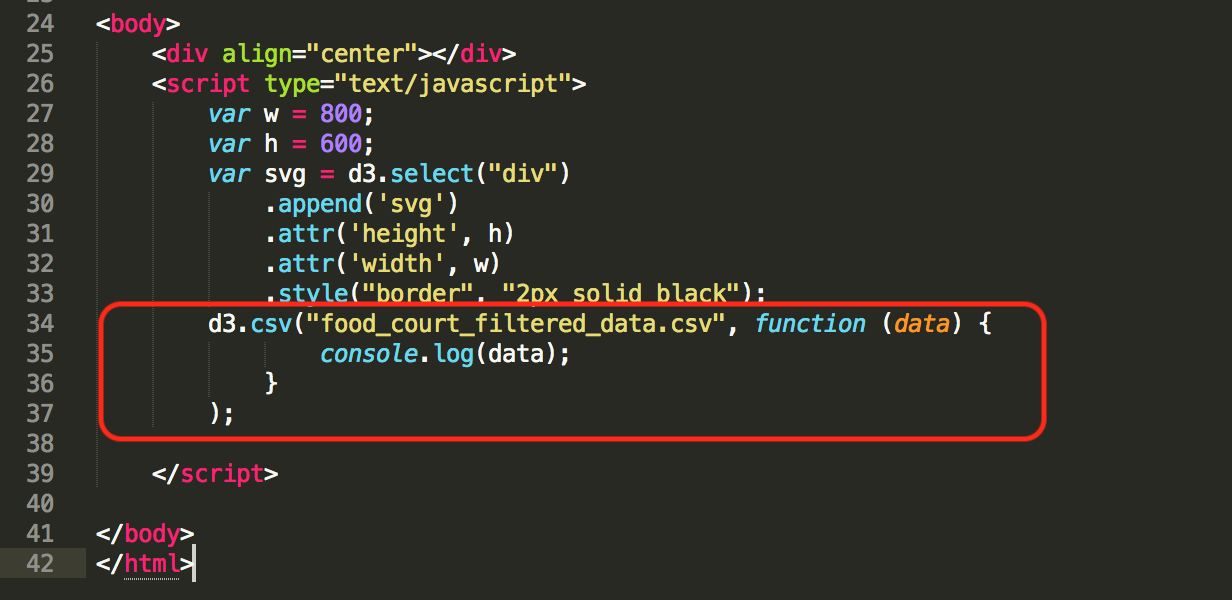
1. **Provide the screenshot of your html page displaying your name in the browser tab:**

**Answer**

**----------------------------------------------------------------------------------------------------**

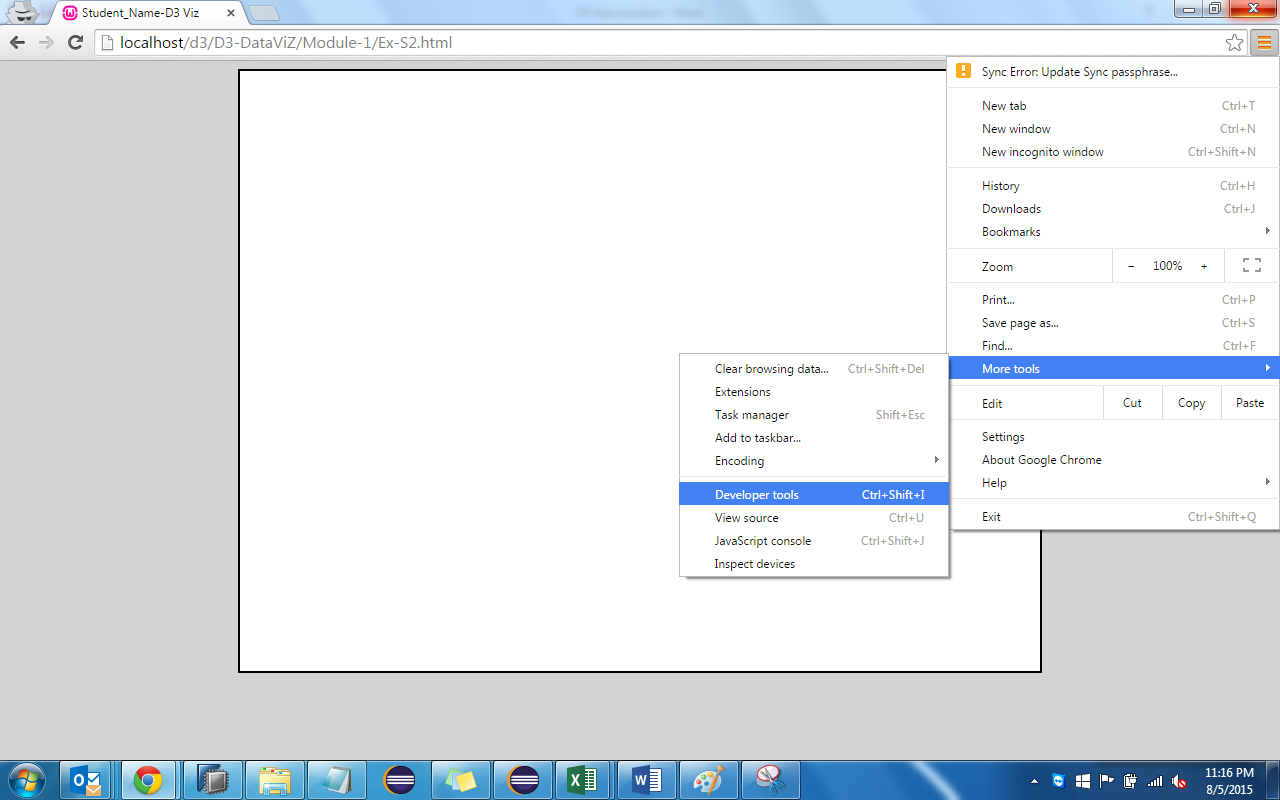
Step 5: Fetch dataset using D3:

* Make you have created new csv file as per instructions given in step 2 and stored it in ‘D3-DataVisualization’ folder created in step 1
* Get csv data into your HTML page using D3function and write data in browser’s console



**Code Explanation**:

* + d3.csv function will pull the data and from the file that will be passed as an input parameter. In this case, the file is "food\_court filtered data.csv".
  + This data will be passed as an input variable for a function.
  + The value that will be returned will be displayed in the console using console.log function.
* Check in browser console if data is pulled from csv





**Question:**

1. **Place the screen shot of your console showing data (objects)**

**Tip:** Clear console using button marked with red circle and refresh the page

**Answer**

**----------------------------------------------------------------------------------------------------**

Step 6: Create bar graph visualizing Gross Sales of various food items

* Before creating bar graph we will sort the data, write below piece of code to sort the data

**Note**: We have removed console log (data), it was just for testing purpose

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**Note:** Labels are case sensitive. If csv labels is named as Gross\_Sales, your

code should address label as Gross\_Sales and not Gross\_sales

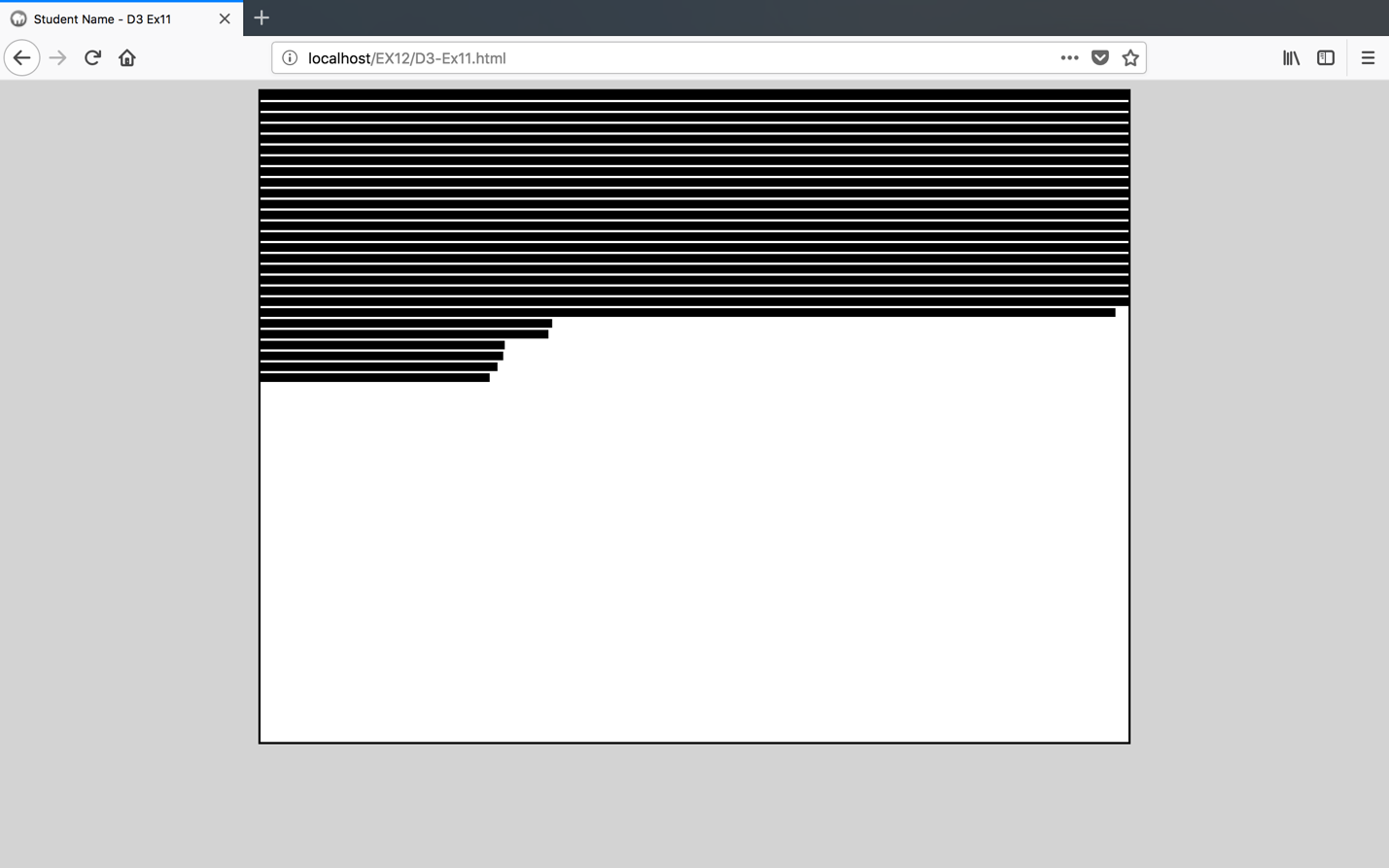
**Code Explanation**:

* + Once the data is pulled into the variable data, it can be sorted using the function sort which can be called using the variable "data" that contains the dataset.
  + The function d3.descending will sort the data in descending order and will return the data.
* To create bar chart we need to first create rectangles (rectangles = bar of bar chart) corresponding to records in our dataset and then we will set property of each bar

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**Code Explanation**:

* + In order to create rectangles using a consistent height and width, rect.attr can be used to set the x and y coordinates of the rectangle.
  + The rectangle will have the same x coordinate and height for each rectangle will also remain same.
  + The only difference would be the y coordinate for the rectangle, ‘i’ is the index of each record and we are multiplying i by 10 so that each record or bar should have distinct starting location
* Refresh your webpage, it should look something like this:

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**Question:**

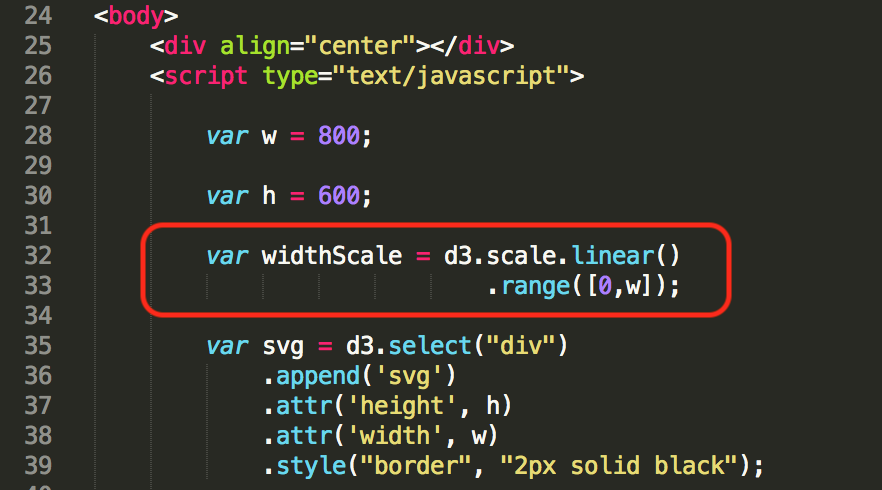
1. **Refresh your web page and paste a screenshot**

**Answer**

**----------------------------------------------------------------------------------------------------**

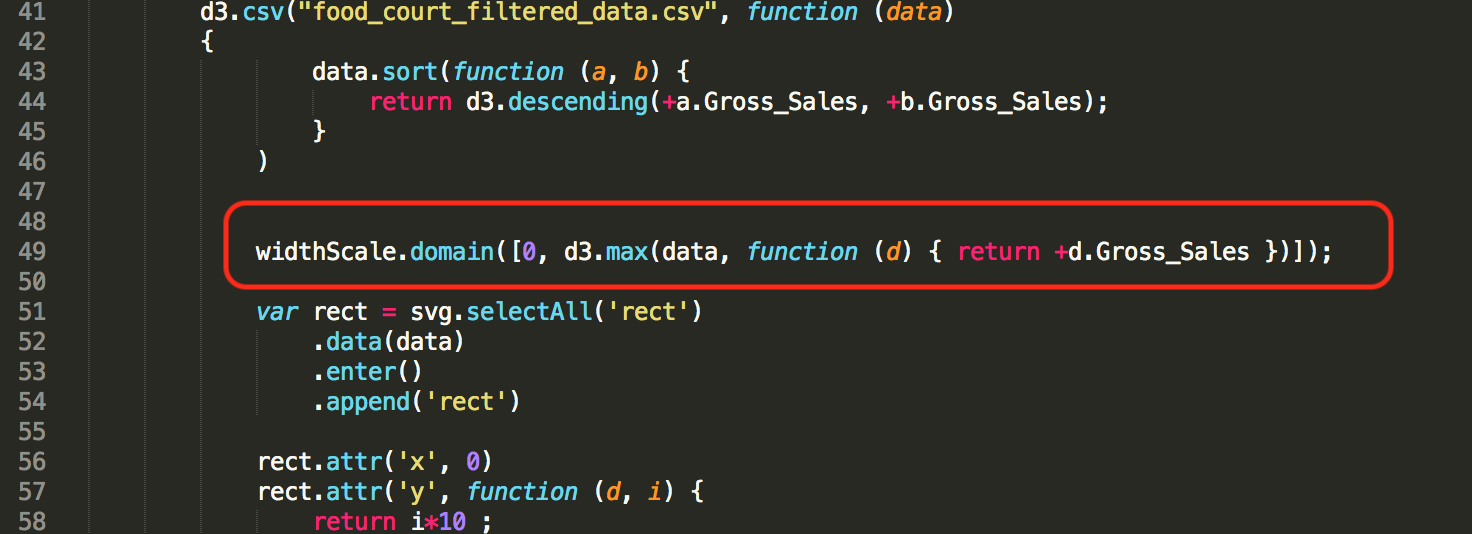
Step 7: Scale the graph

* Horizontal Scaling
  + As of now the bar graph that we have created is not scaled, so first we will scale the width of the graph, make following changes in the code:
  + Create a new variable widthScale and set the range 0 to width of svg



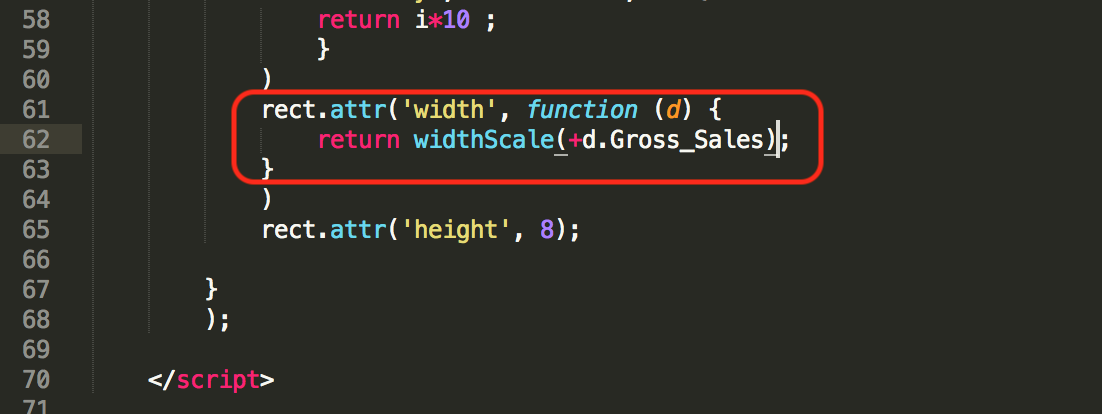
**Code Explanation**:

* + WidthScale for the rectangle will help in creating the rectangles based on different size dynamically. The function d3.scale.linear.domain and d3.scale.linear.range will map the values of the input variables to the output variables
  + Eg. if d3.scale.linear.domain contains value between 0 -200 and range contains value 0-500 then the input value of 100 will be mapped to an output value of 250.
  + Add below piece of code to set the domain of the scale



**Code Explanation**:

* + The above code adds the domain value for the widthScale that was defined in the previous step.
  + Replace the code written inside width attribute of the rectangle with below piece of code



**Code Explanation**:

* + As mentioned in the above steps the values of widthScale for domain and range will map the input to the output values.
  + Thus, when Gross sales will be passed as a value to the function widthScale, the values will be mapped to their equivalent output value similar to the e.g. mentioned in the previous step.
* Refresh your webpage, it should look something like this:



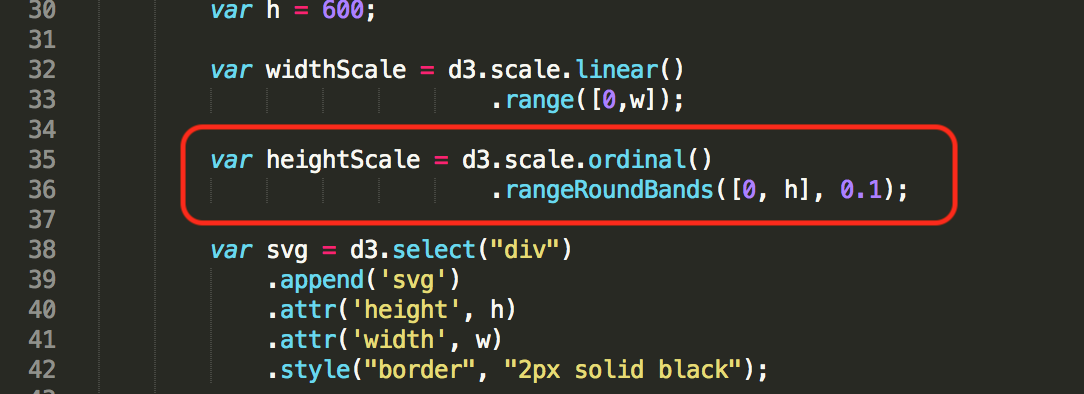
**Question:**

1. **Provide the screenshot of your html page displaying your name in the browser tab:**

**Answer**

**----------------------------------------------------------------------------------------------------**

* Height Scaling
  + Make following changes in the code to scale height of the graph:
  + Create a new variable heightScale and set the range 0 to height of the svg



**Code Explanation**:

* + The widthScale will map the numerical input values to their numerical output values.
  + The ordinal scale will map the categorical input values to their categorical output values
  + Add below piece of code to set the domain of the scale

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**Code Explanation**:

* + heightScale.domain function will set the input range for the heightScale variable.
  + In this case, the values is set to 27 so the input range would be from 0-26.
  + Replace the code written inside Y attribute and height attribute of the rectangle with below piece of code

**Question:**

1. **Provide the screenshot of your html page displaying your name in the browser tab:**

**Answer**

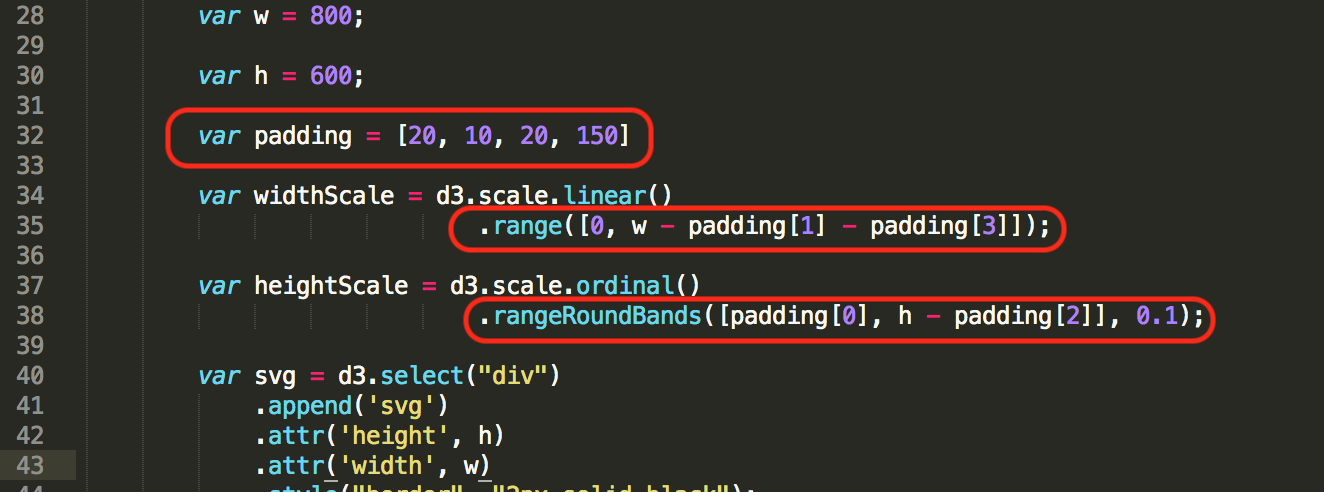
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Step 8: Add padding (margin) to the graph

Before adding axis to the graph we need to create some padding i.e. we need to make some space to the right, left, bottom and top of the graph

Make following changes in the code to add padding:

Create new variable padding:

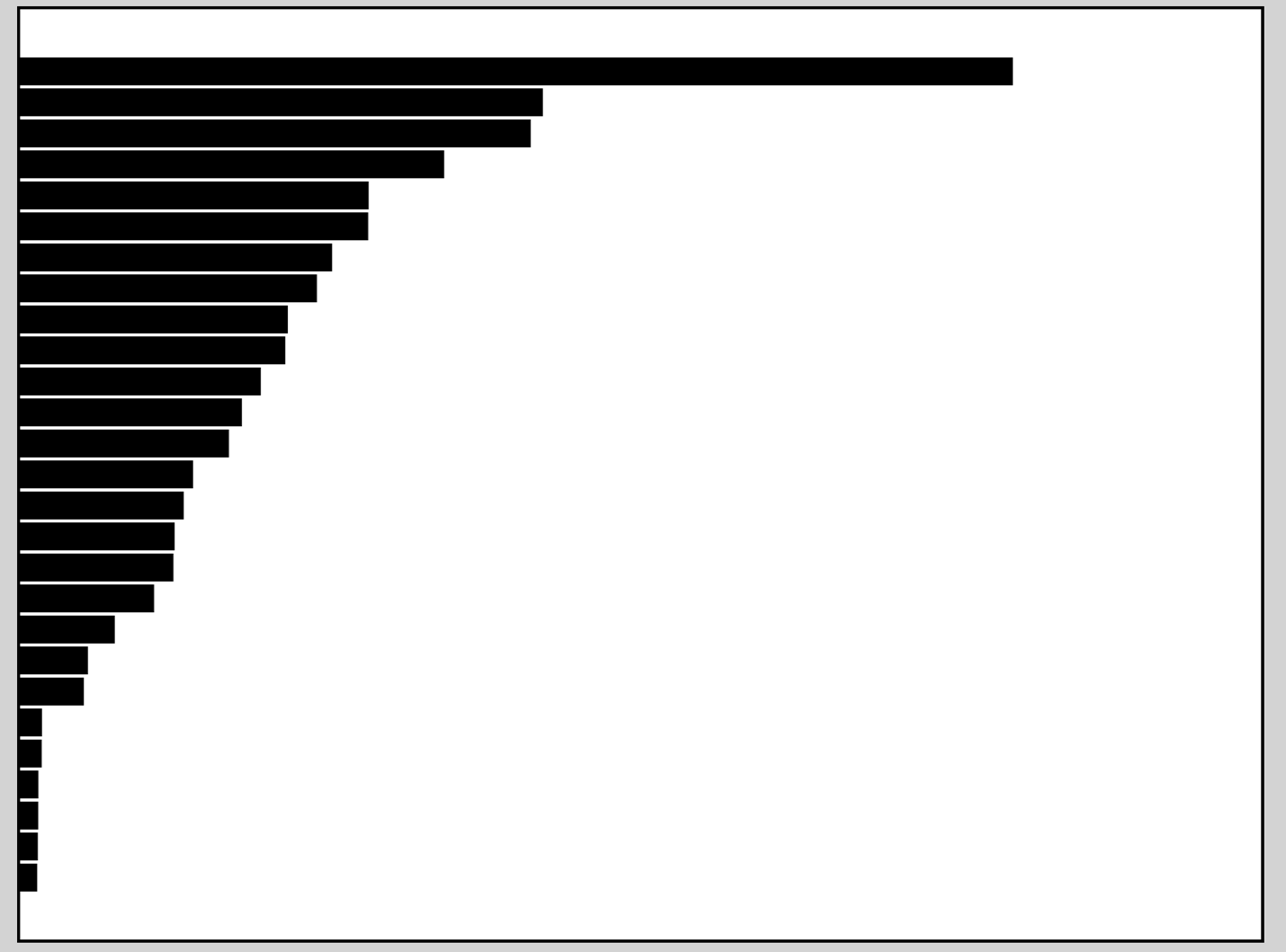


**Code Explanation**:

* Padding variable consists of an array whose values can be used to append space around the svg frame. The order of the alignment is mentioned in the comments.

To reduce width and height of the graph or in other words to add padding to the right and bottom of the graph make following changes in the width and height variables:

Without refreshing current tab open your webpage in a new tab/window and compare the graph with previous tab, your graph should look like this:



To add padding to the left of the graph, make following code changes in X attribute of rectangle:



**Code Explanation**:

* + The x coordinate for the rectangle will be set using the variable padding[3].This will set the x coordinates to the value mentioned in padding[3].

**Question:**

1. **Provide the screenshot of your html page displaying your name in the browser tab:**

**Answer**

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Step 9: Add x-axis and y-axis

First we will add x-axis to our graph, make following changes in the code to add x-axis:

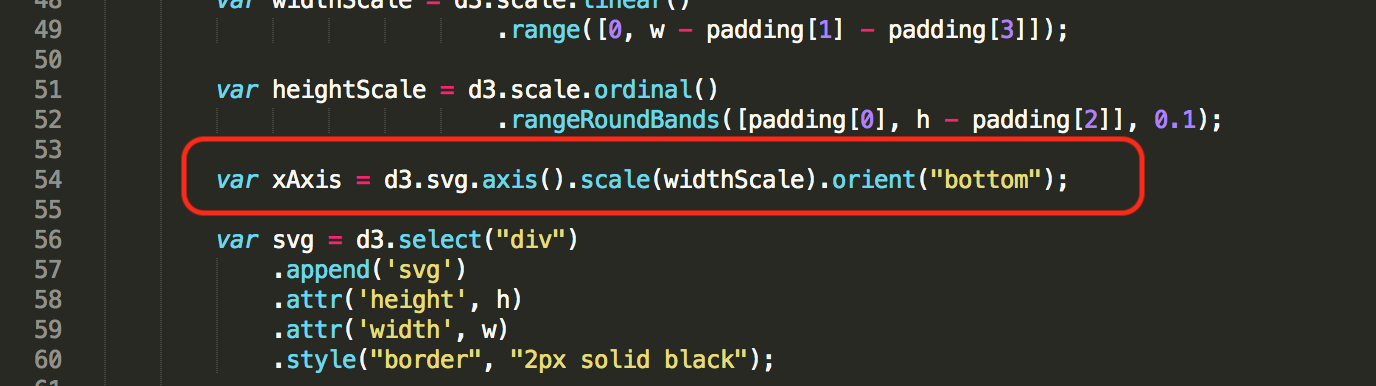
To give style to our axis add following css style code



**Code Explanation**:

* + Formatting for the axis in the svg can be done using .axis path and .axis line.
  + .axis text will set the font size and family of the text for the axis in the svg frame.

Create a new xAxis variable



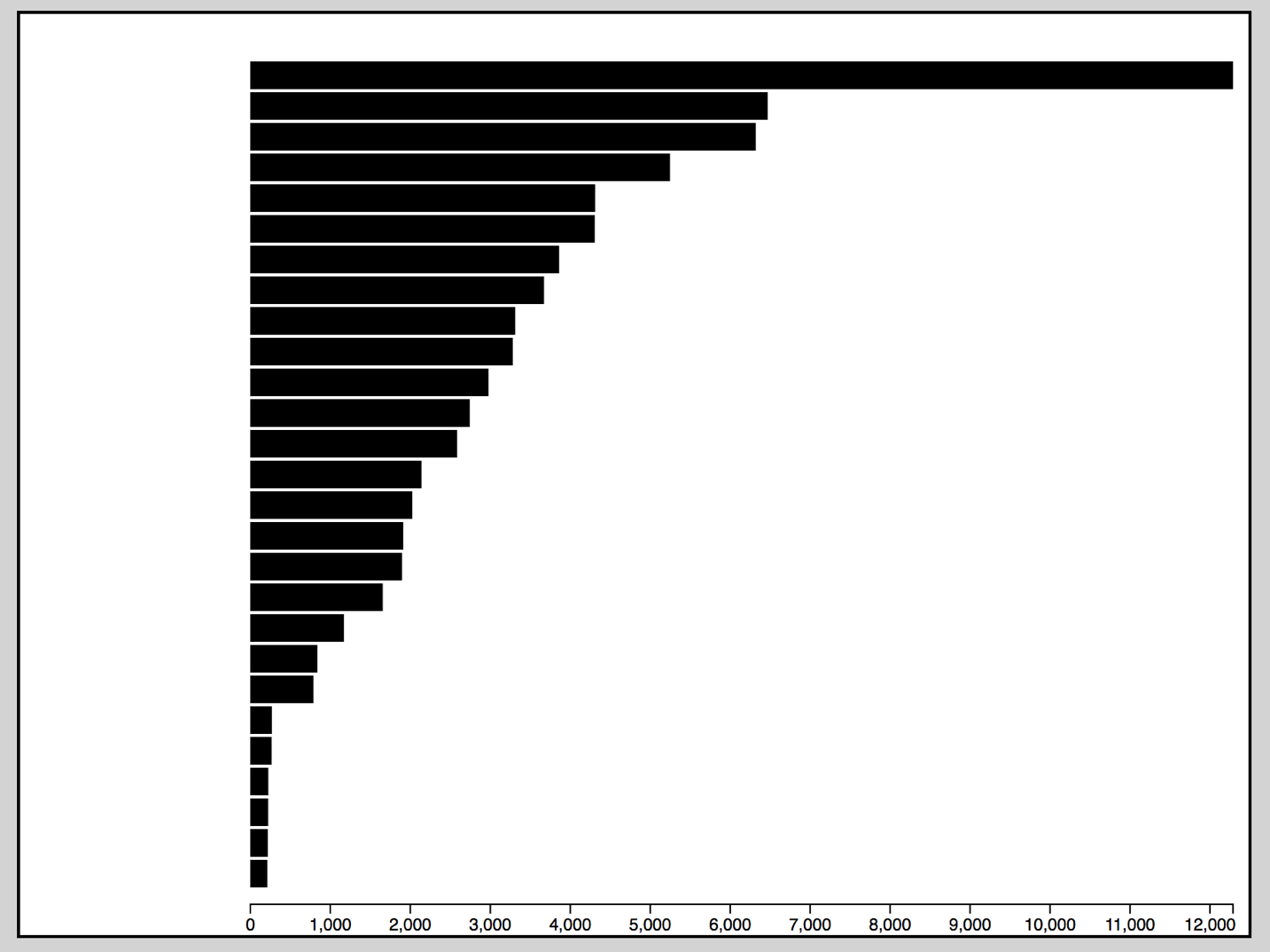
**Code Explanation**:

* + Orient function will place the text of the x axis at the bottom of the x axis.

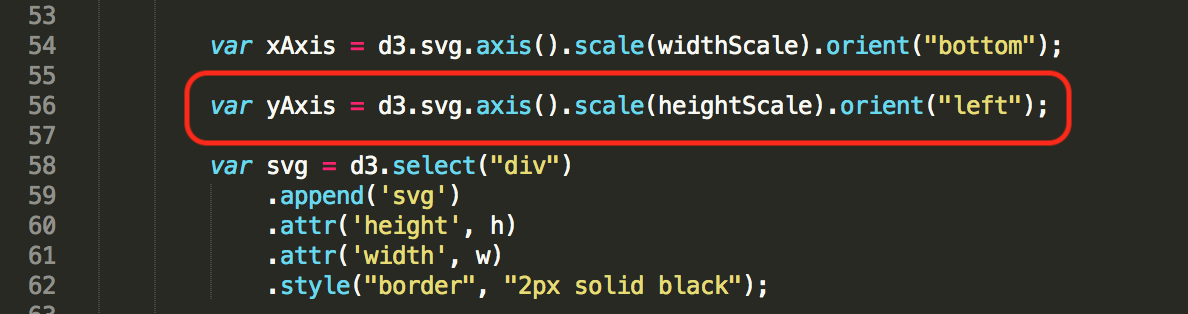
Add a group element in svg image to display x-axis



* Refresh your webpage, it should look something like this:



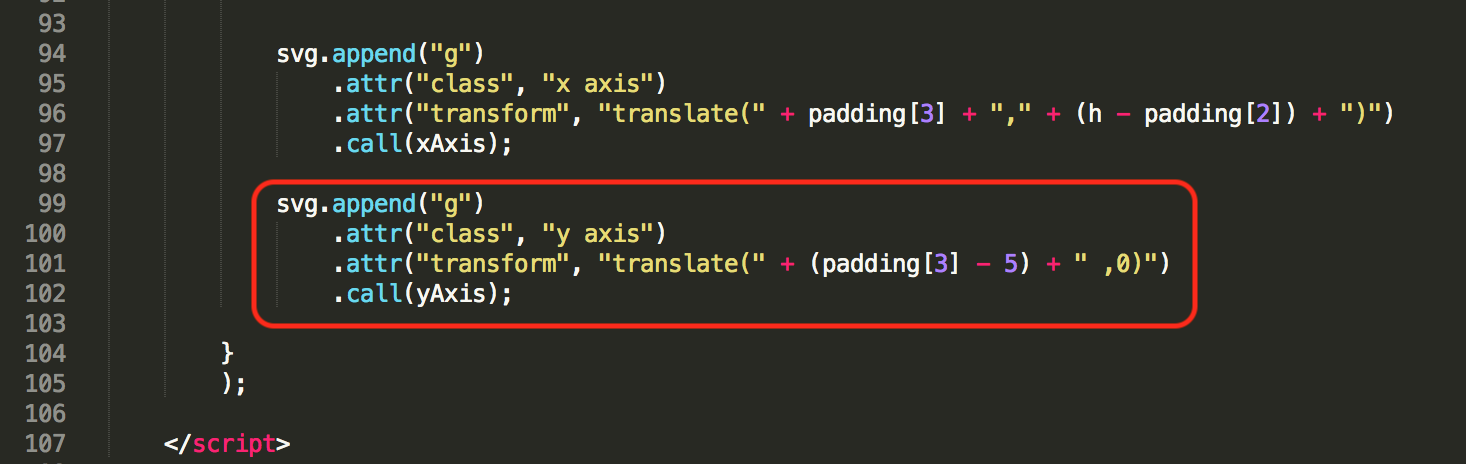
* Now we will add y-axis to our graph, make following changes in the code to add y-axis:
* Create a new yAxis variable



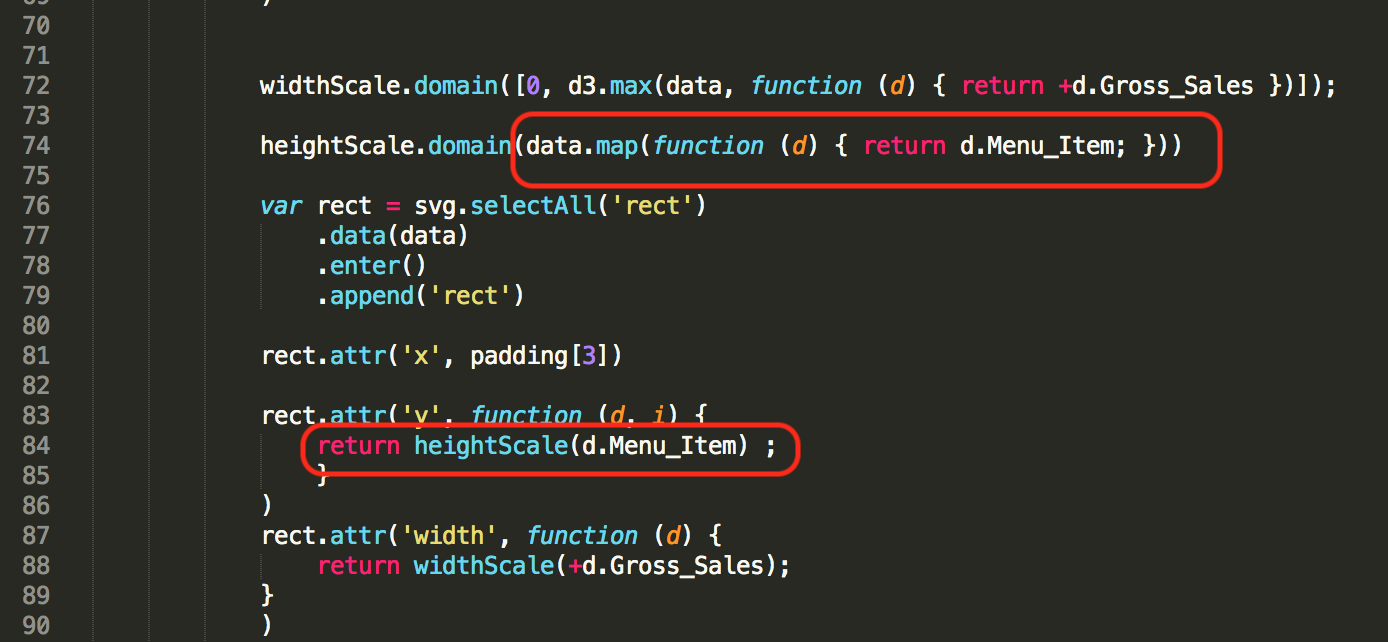
**Code Explanation**:

* + Similar to the vertical y axis the text values will be to the left of the axis using the orient function

Add a group element in svg image to display y-axis



* Make following changes in the code to label y-axis



**Code Explanation**:

* + The value for the y axis from the previous steps contain range from 0-26. This range value has to be replaced with a meaningful categorical value.
  + For the food court dataset the value will be replaced with the menu items.

**Question:**

1. **Provide the screenshot of your html page displaying your name in the browser tab:**

**Answer**

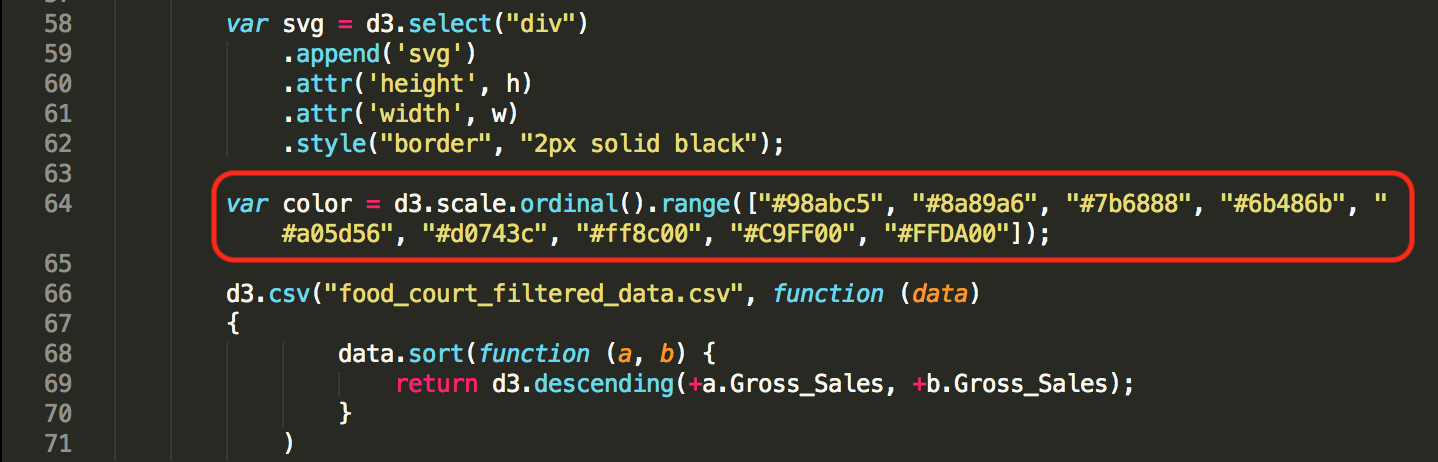
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Step 10: Color code Store Names

* There are nine different store names in our dataset and now we will color code them
* Add a new color variable containing range of 9 different colors, one for each store

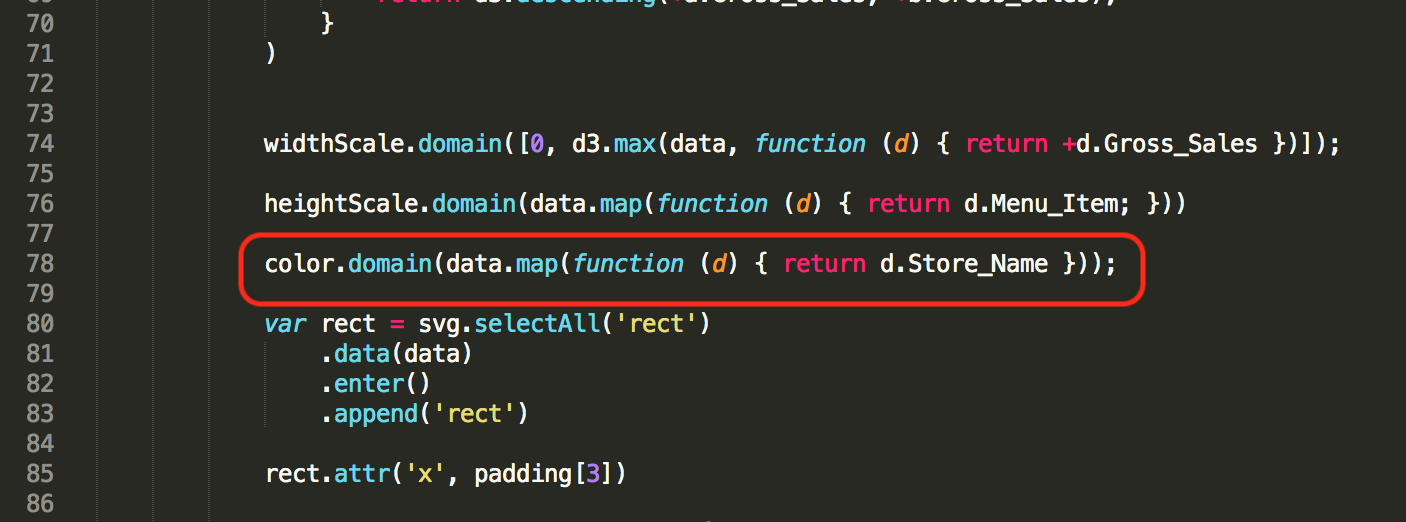
Code snippet

var color = d3.scale.ordinal().range(["#98abc5", "#8a89a6", "#7b6888", "#6b486b", "#a05d56", "#d0743c", "#ff8c00","#C9FF00","#FFDA00"]);



**Code Explanation**:

* + Create an ordinal scale variable color and set the range for the categorical variables with the color code that is to be assigned to distinguish the clusters.
* To map each color with store name add below piece of code:



**Code Explanation**:

* + The domain value for the scale can be set using the Store Name present in the dataset.
* Finally to fill each bar/rectangle with color add below piece of code:



**Code Explanation**:

* + The color in the rectangle can now be filled using the categorical "color" scale created in previous steps.
  + Thus, the input values of store for each rectangle will decide the color for the rectangle using the output range of the scale "color" that is set in the previous steps.

**Question:**

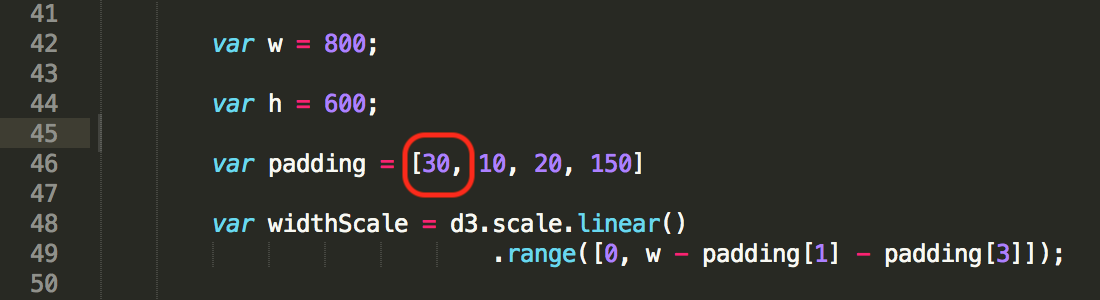
1. **Provide the screenshot of your html page displaying your name in the browser tab:**

**Answer**

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Step 11: Add title to your graph

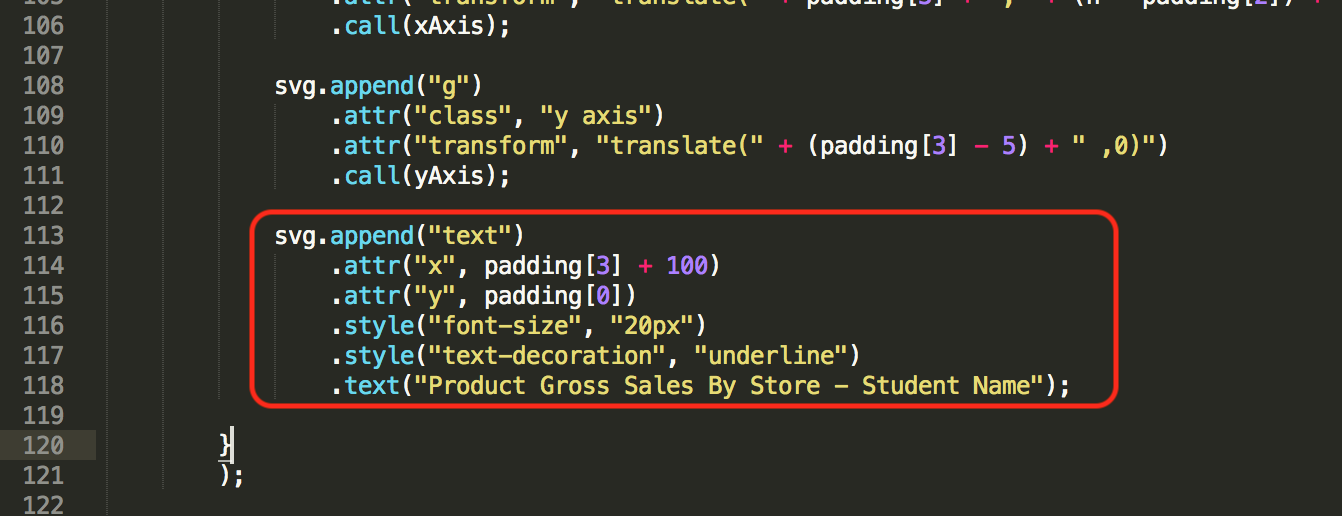
* To add graph title at the top we first need to increase the top padding, change top padding from 20 to 30



Note: If any of the labels or x axis is cut off, change values in padding accordingly.

Any Visualization shouldn’t have cut off labels.

* To display title add text to svg image



**Code Explanation**:

* + Title for the svg frame can be appended using the append function and setting the values of the text attribute to the desired values.

**Question:**

1. **Provide the screenshot of your html page displaying your name in the browser tab:**

**Answer**

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Step 12: Add legend

* To add legend in the graph we need to add following piece of code:
* Append legend group in svg image



* Refresh your webpage, it should look something like this:

Add text to legend colors



**Question:**

1. **Provide the screenshot of your html page displaying your name in the browser tab:**

**Answer**

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**Instructions**

1. **Submit your HTML file in e-learning**
2. **Submit only the solutions (without the steps) in a word document in e-learning**