CSCI3100 Project Tutorial 3:
Client-side Technologies

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February 20, 2023

Demo code: https://github.com/CUHK-ARISE/3100-PJ-TUT-3

Client-side Technologies

- HTML5: defines how two computers speak to each other over the Internet.

- CSS3.0: renders your webpage to make it more friendly and attractive.

- JavaScript: beyond electronic publishing (animation, online DB).

  - jQuery: extensible JS library, huge source, simple syntax.

  - Ajax: communicate with the server in the background, smooth interaction.
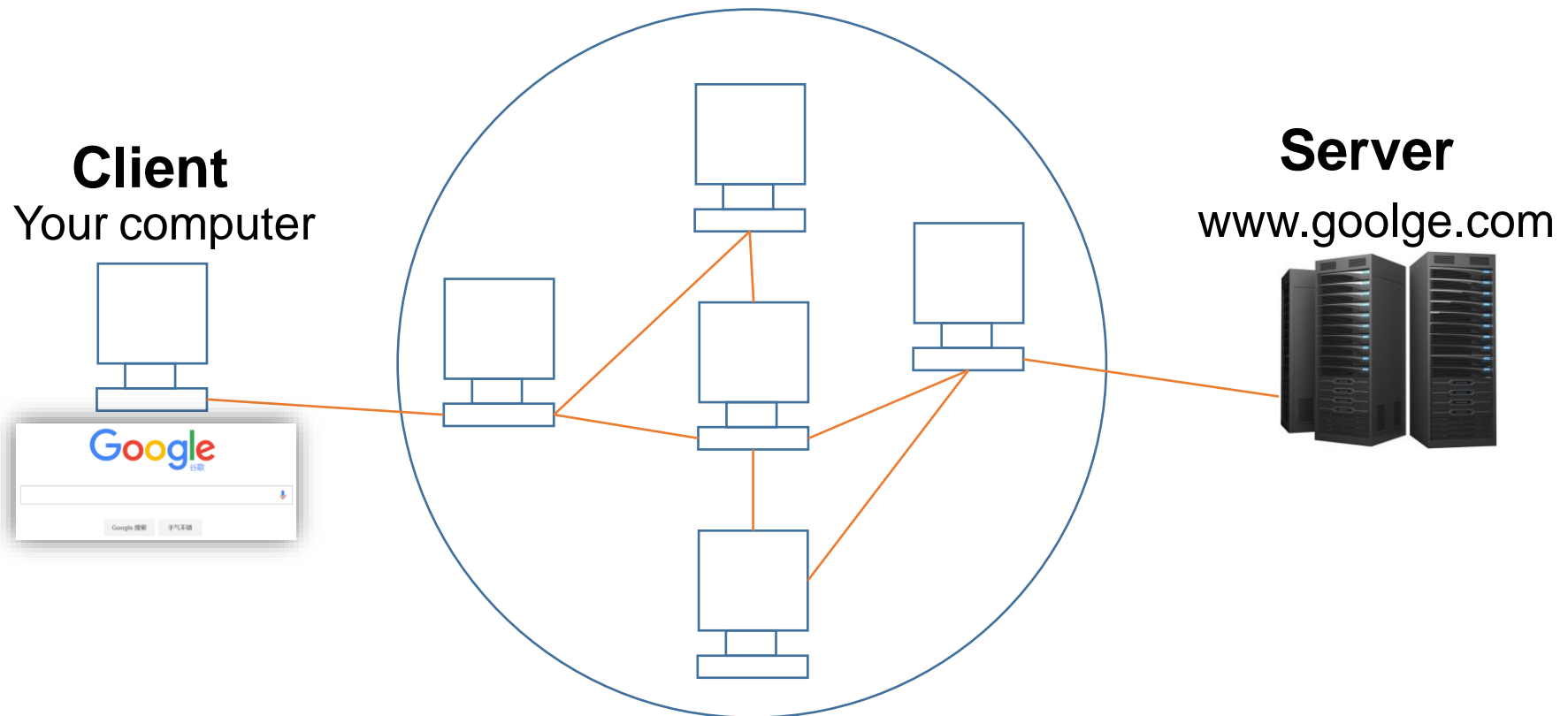
Outline

- ❑ Introduction

- ❑ HTML

- ❑ CSS3

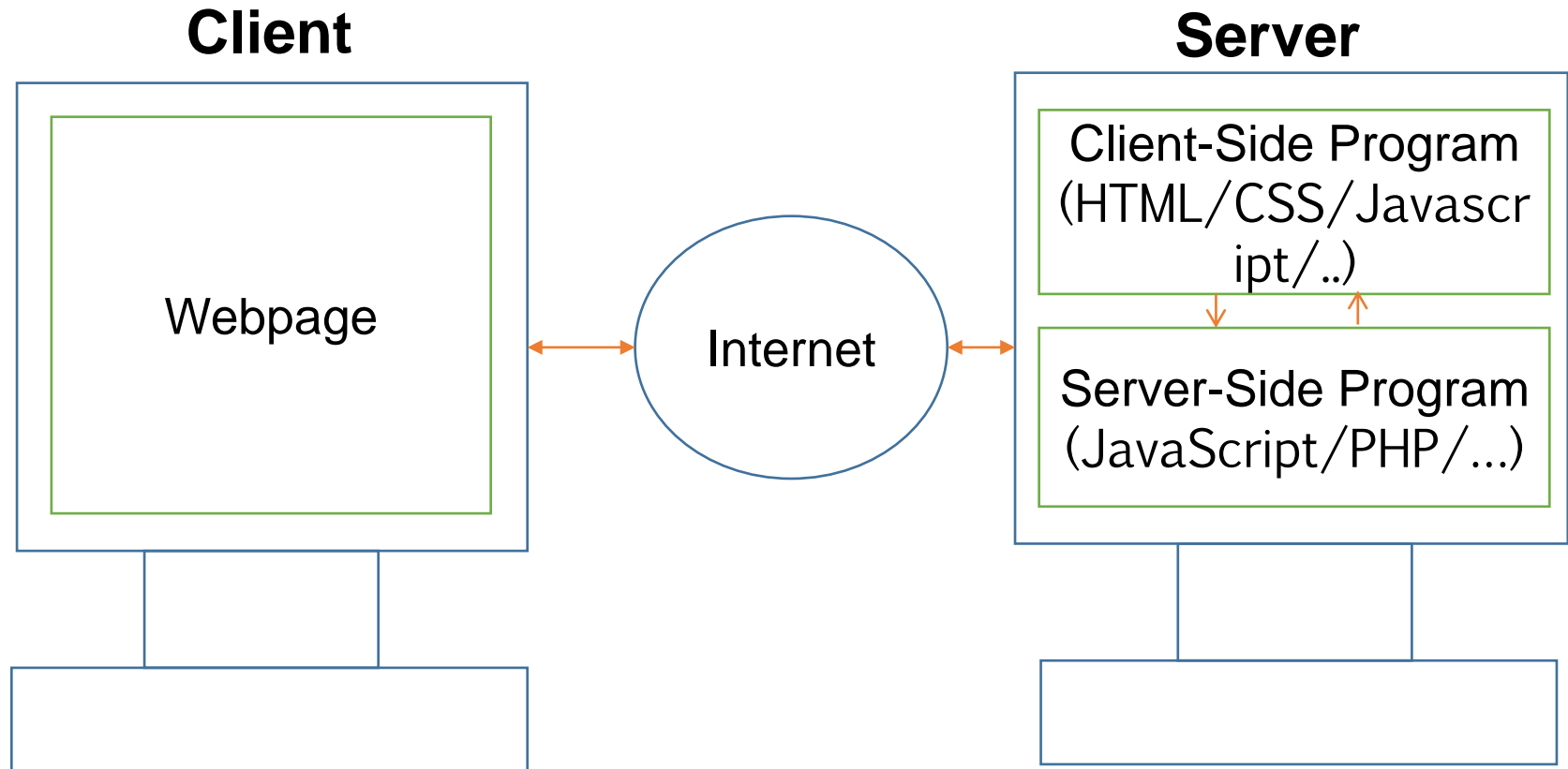- ❑ Javascript

  - ▪ jQuery
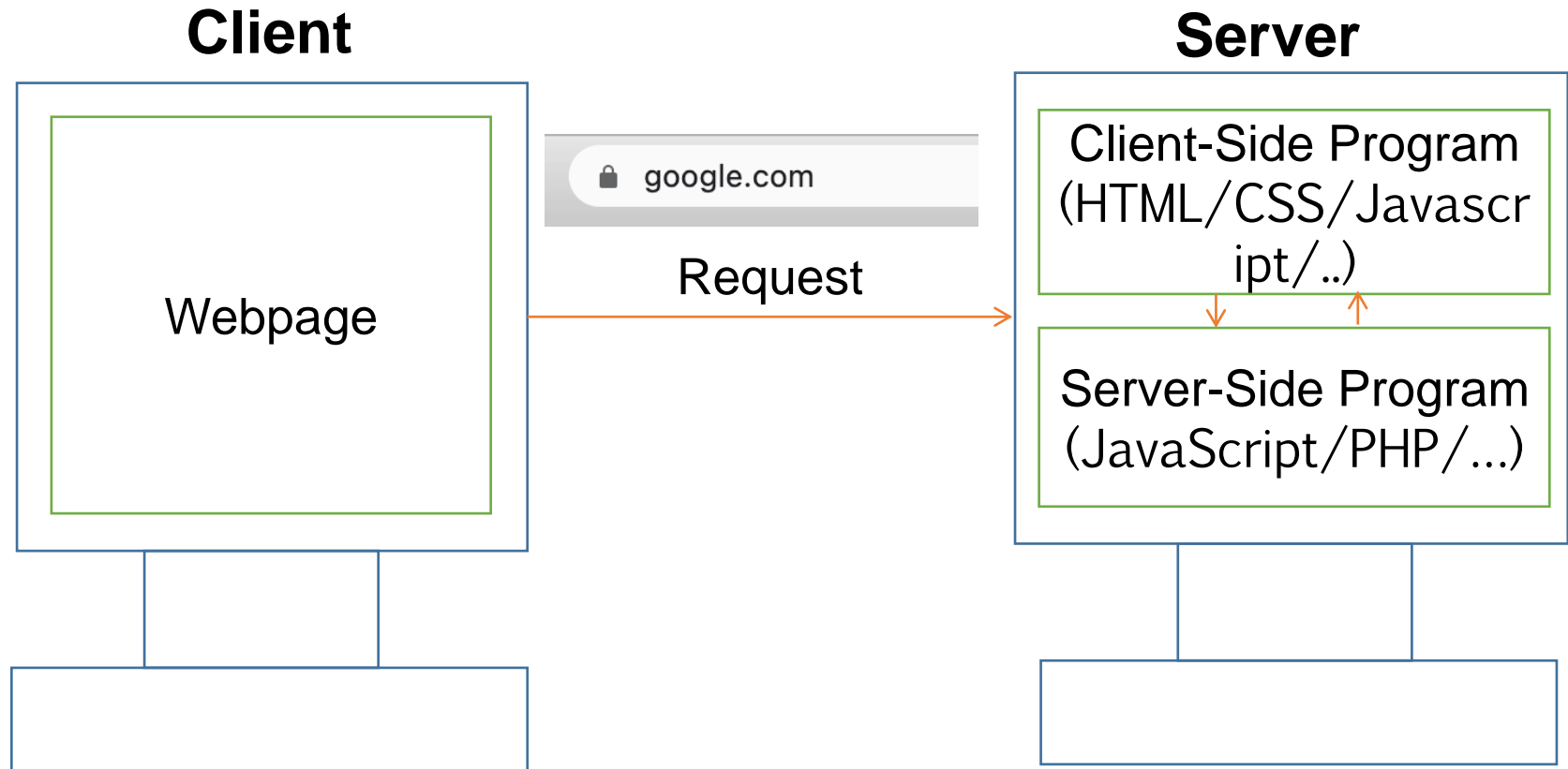
  - ▪ Ajax

Introduction

- What is network (e.g. Internet)?

Internet

Client
Your computer

Server
www.goolge.com

- What is web programming? E.g., visiting **Google**

Client

Webpage

Internet

Server

Client-Side Program (HTML/CSS/Javascript/..)

Server-Side Program (JavaScript/PHP/...)

• How it works

Client

Webpage

google.com

Request →

Server

Client-Side Program (HTML/CSS/Javascript/..)

Server-Side Program (JavaScript/PHP/...)

Google

- How it works

Client

Webpage

Client-Side Program
(Define the website
content or the
requested info)

Respond

"index.html"

Server

Server-Side Program

- How it works

Client

Webpage

Client-Side Program
（Running）

Server

Server-Side Program
（Running）

Interaction
(request/respond)

Google

HTML5

http://proj.cse.cuhk.edu.hk/csci3100/

mac: Cmd + Opt + I
win: Ctrl + Shift + I

F12

on your browser

⚠ Not Secure | proj.cse.cuhk.edu.hk/csci3100/

3. Coding   6. System Testing   7.

☆ NEWS

18-Jan: Assignment 1 is released (due on Feb. 07, 2021, Sunday). Please submit your answers together with the VeriGuide receipt to Blackboard. Questions of tutorial 1 are also provided. You are highly encouraged to finish them before the tutorial.

11-Jan: [Group Registration] Please click Project Group Sign-up to register for your group. Each group should contain 5 students, please enter the student IDs of your group members in the above google sheet. The team formation will be due on **Jan. 22 (23:59:59pm)**.

11-Jan: Please login to your blackboard through 🔗Blackboard and make sure 2020R2 Software Engineering (CSCI3100) is available.

11-Jan: Please join the Piazza of CSCI3100 Spring 2021 through the link 🔗Course Forum Link.

11-Jan: New semester starts, welcome to CSCI 3100!

Elements Console Sources **Network** Performance Memory »

● ⊘ ▽ Q ☐ Preserve log ☑ Disable cache Online ▼

Filter ☐ Hide data URLs All XHR JS CSS Img Media Font Doc WS Manifest Other

☐ Has blocked cookies ☐ Blocked Requests

10000 ms 20000 ms 30000 ms 40000 ms 50000 ms 60000 ms 70000 ms

Name | Headers **Preview** Response Initiator Timing Cookies

csci3100/
bootstrap.css
font-awesome.min.css
style.css
css?family=Open+Sans
css?family=Open+Sans
background.png
mem8YaGs126MiZpBA-UFV...
glyphicons-halflings-regular...
zbchen.png
wcgu.jpg
jthuang.jpg
jyliu.jpg

21 requests 2.7 MB transferred

NEWS

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Console What's New ✕

Highlights from the Chrome 87 update

Mapping

Client-side Programming?

Introduction to HTML5 & CSS3

HTML

- ## What is HTML?

  ❑ HyperText Markup Language
  ❑ HTML is how two computers speak to each other over the Internet.
  ❑ Written as a tag file.

```html
<html>
        <head>
                <title>My Title</title>
        </head>
        <body>

                <!-- THIS IS THE COMMENT -->
                <img src='https://www.cuhk.edu.hk/chinese/images/cuhk_logo_2x.png />

                <div>

                        <h1>My First Heading </h1>
                        <p>My First paragraph</p>
                </div>
        </body>
</html>
```
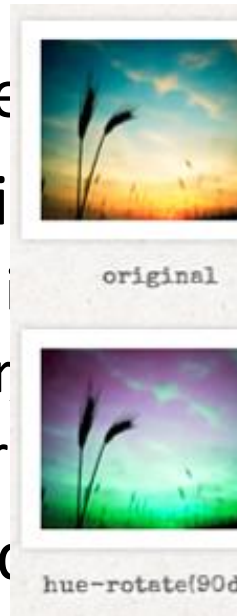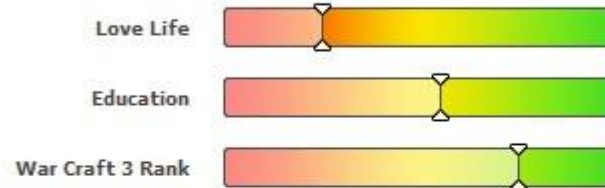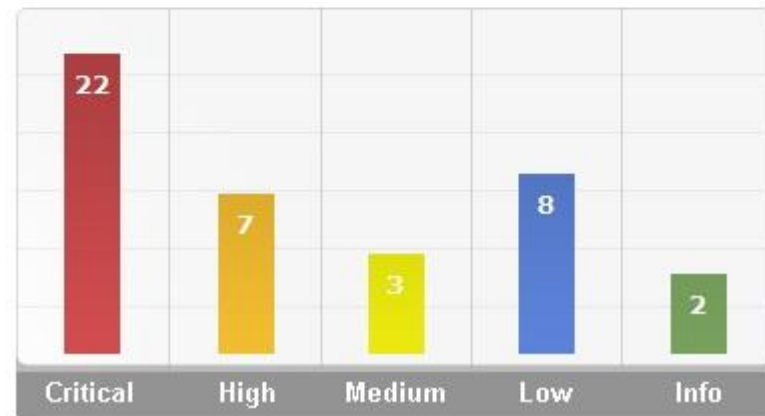
HTML

- Structure of HTML Tags

```
<html>
    <head>
        <title>My Title</title>
    </head>

    <body>
        <img src='http://www.google.com.hk/images/srpr/logo3w.png' />

        <div>
            <h1>My First Heading </h1>

            <p>My First paragraph.</p>
        </div>
    </body>
</html>
```

HTML

- Tags:
  - E.g. <html></html>
- Type of tags
  - html, head, body, script, title, p, a, br, div, li, ul, select, option, span, button, textarea, center, em, iframe, input, link, tr, td, table …
  - See list here: http://www.w3schools.com/tags/default.asp
- Good IDE:
  - Webstorm, Visual Studio Code, Sublime Text …..
  - You can find more here: https://www.hostinger.com/tutorials/best-html-editors

HTML

- How to write HTML?

HTML Versions

Version	Year
HTML	1991
HTML 2.0	1995
HTML 3.2	1997
HTML 4.01	1999
XHTML	2000
HTML 5	2014

HTML 5

- Canvas is one
- You can use i
  - 2D Game (li
  - Image filter
  - Complex gr
- It's controlled

original

hue-rotate(90d

Basic Bar Graph

54%

8%

Complex Bar Graph

Love Life

Education

War Craft 3 Rank

Vertical Bar Graph

22				
	7		8	
		3		2
Critical	High	Medium	Low	Info

HTML 5

- Canvas

```
<html>
<body>

<h2>canvas demo</h2>
<canvas id="myCanvas" width="200" height="100"
style="border:1px solid #000000;">
</canvas>

<script>
var c=document.getElementById("myCanvas");
var ctx=c.getContext("2d");
ctx.beginPath();
ctx.arc(95,50,40,0,2*Math.PI);
ctx.stroke();
</script>

</body>
</html>
```

See APIs: https://developer.mozilla.org/en-US/docs/Web/API

CSS 3

❑Sty   zed.

❑Wri   in the

Basic Anatomy of a CSS Rule

Element   Property   Value

h2 {

    color: #333; — — — — — — — — Declaration Syntax:
                                  Property then Colon
    font-size: 150%;   Value then Semicolon
    margin: 5px 0 10px 15px;

}

Rule

Declaration
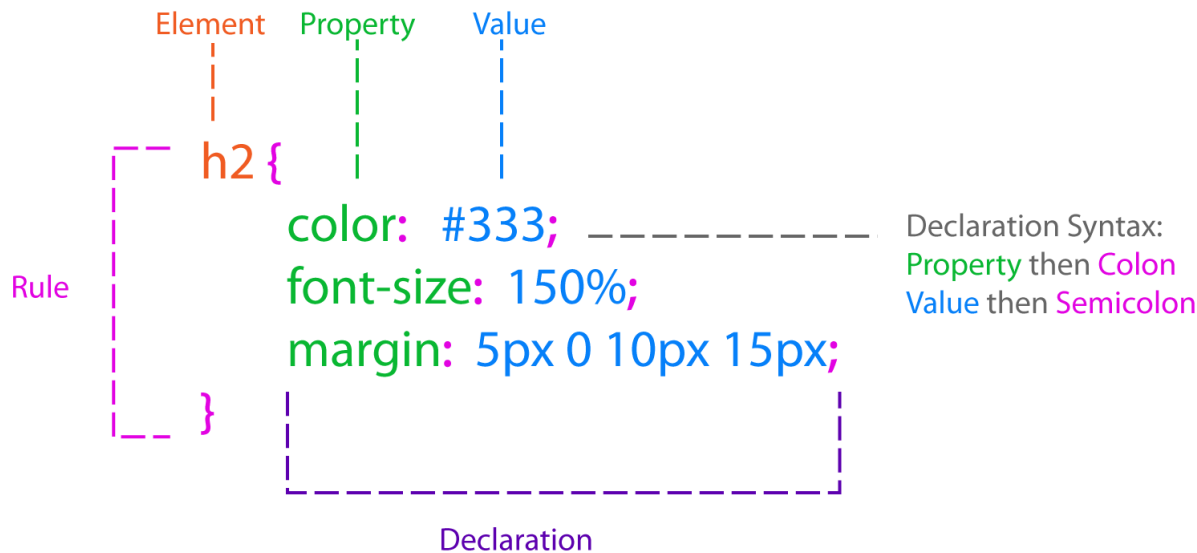
Declaring a CSS Rule for a **Class** Attribute

the XHTML
Brochure

the CSS
.pdf {background: url(images/pdf.gif) no-repeat left 50%;}

use a period when writing a rule for a class

Declaring a CSS Rule for an **Id** Attribute

the XHTML
<div id="wrapper">Main Content</div>

the CSS
#wrapper {width: 750px; margin: 0 auto;}

use a pound sign when writing a rule for a id

CSS 3

- What is style?

For contents in `<body></body>`

For contents in `<img></img>`

```html
<!DOCTYPE html>
<html>
<head>
<title>Page Title</title>
<style>
body {
    background-color: black;
    text-align: center;
    color: white;
    font-family: Arial, Helvetica, sans-serif;
}
</style>
</head>


<body>

<h1>This is a Heading</h1>
<p>This is a paragraph.</p>
<p>Edit the code in the window to the left, and click
"Run" to view the result.</p>
<img src="avatar.png" alt="Avatar" style="width:200px">

</body>
</html>
```

This is a Heading

This is a paragraph.

Edit the code in the window to the left, and click "Run" to view the result.

CSS 3

- What is style?

change to 100px

```
<!DOCTYPE html>
<html>
<head>
<title>Page Title</title>
<style>
body {
  background-color: black;
  text-align: center;
  color: white;
  font-family: Arial, Helvetica, sans-serif;
}
</style>
</head>

<body>

<h1>This is a Heading</h1>
<p>This is a paragraph.</p>
<p>Edit the code in the window to the left, and click
"Run" to view the result.</p>
<img src="avatar.png" alt="Avatar" style="width:100px">

</body>
</html>
```

This is a Heading

This is a paragraph.

Edit the code in the window to the left, and click "Run" to view the result.

CSS 3

- HTML file

```
<html>
        <head>
                <link rel="stylesheet" type="text/css" href="myStyle.css" />

                <title>My Title</title>
        </head>
        <body>


                <img src="http://www.google.com.hk/images/srpr/logo3w.png" />
                <div>
                        <h1>My First Heading </h1>
                        <p>My First paragraph.</p>
                </div>
        </body>
</html>
```

CSS 3

- style.css

```
div{
        width:90%;
        height:70%;margin-left:4%;
        margin-top:5px;
        padding:20px;
        background:#FFEEBB;
        -webkit-box-shadow:2px 2px 10px #000;
}

h1{

        color: #1122BB;

}

p{

        text-shadow: 2px 2px 2px #CCCCCC;
}
```

CSS 3

- Please try more properties and learn to organize your website with CSS style.
  - ➢ 2D & 3D transformation
  - ➢ Animations
  - ➢ Multi-column
  - ➢ Text effect
  - ➢ Gradient & border radius

- Tutorial:

http://www.w3schools.com/css/default.asp

http://www.codecademy.com/learn

http://www.tutorialspoint.com/web_development_tutorials.htm

Client-side Programming

Introduction to Javascript & AJAX

Highlights of JavaScript

- JavaScript is not the script version of Java

Highlights of JavaScript

- JavaScript is not just the front end programming language.

GitHub Language Rankings, 2018-2020

Language	2020 Ranking	2019 Ranking	2018 Ranking
JavaScript	1	1	1
Python	2	2	3
Java	3	3	2
TypeScript	4	7	4
C#	5	5	6
PhP	6	4	4
C++	7	6	5
C	8	9	8
Shell	9	8	9
Ruby	10	10	10

Basic Syntax of JavaScript

- The console and basic operations
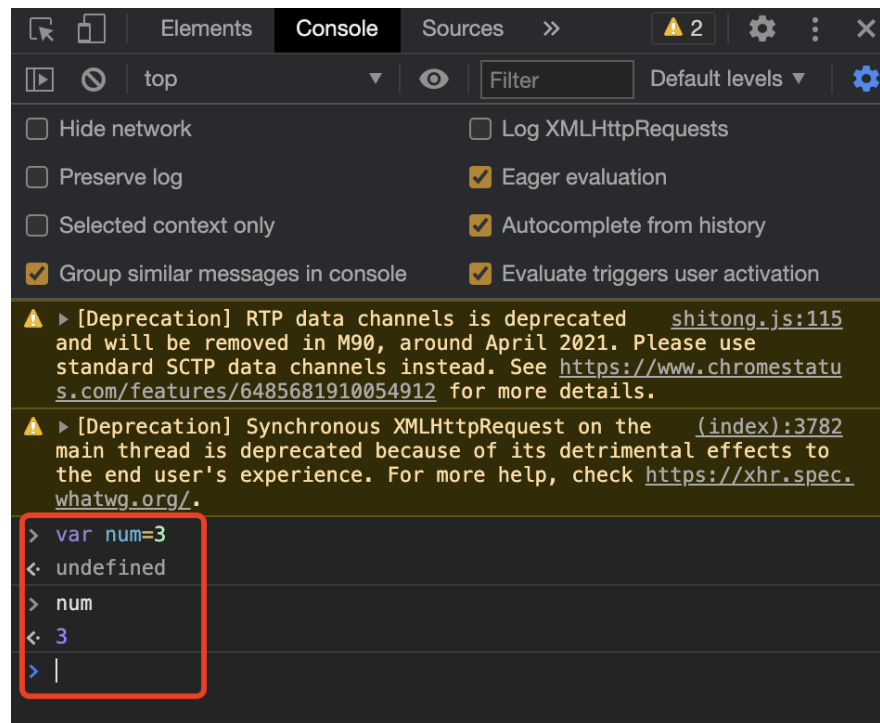
Basic Syntax of JavaScript

- Variables

```
var netPrice;
var netWeight = 0;
netPrice = 1;
netWeight += 1;
```

- Array

```
var fruit = ['apple', 'lemon', 'banana'];
var color = new Array('red', 'green', 'blue');
```

- Object

```
var profile = {
    name: 'Bob',
    age: 99,
    job: 'Freelance Hit'
};
```

- Functions

```
function sayHello(){
    alert("Hello!");
}
function sayBye(name) {
    alert(name + "bye!");
    return name;
}
```

- Conditional Statements

```
function detectSpam(input) {
    input = input.toLowerCase();
    if(input.indexOf("fake") < 0) {
        return false;
    }
    return true;
}
```

- Operators

```
netWeight += 1;
netPrice ++;
var productPrice = subtotal / productCount;
var fullName = firstName + " " + surName;
var ageStr = "David is " + 45;
```

Find more details here: https://www.w3schools.com/js/DEFAULT.asp

HTML Integrated with JavaScript

- The `<script>` Tag

```
<script>
    … JavaScript statements …
</script>
```

- In HTML 4.x or XHTML pages:

```
<script type="text/javascript">
    … JavaScript statements …
</script>
```

- Put your JavaScript in a separate file (**Recommended**)

```
<script src="/path/to/mycode.js"></script>
```

DOM and JavaScript

- Document Object Model - W3C (World Wide Web Consortium) standard
- JavaScript interacts with HTML page content via DOM access.

```javascript
window.alert("Warning!")
document.write("Hello World!")
window.onload = function () { ... }

document.getElementById("btn1")

        .onclick = sheet;
```
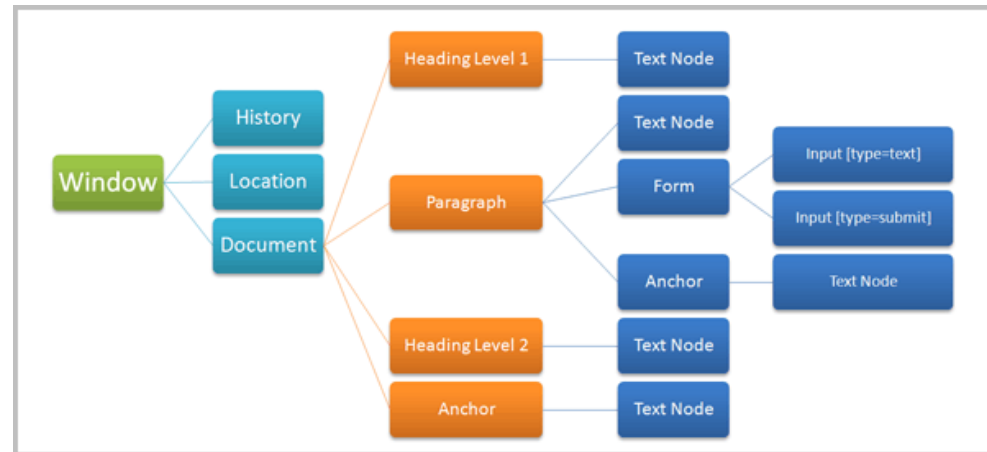


```javascript
var para = document.createElement("p");
var node = document.createTextNode("This is new.");
para.appendChild(node);


var element = document.getElementById("div1");
element.appendChild(para);
```

JavaScript and HTML5

- ## Some new HTML5 tags
  - New **semantic** elements like <header>, <footer>, <article>, and <section>.
  - New form **control attributes** like number, date, time, calendar, and range.
  - New **graphic** elements: <svg> and <canvas>.
  - New **multimedia** elements: <audio> and <video>.
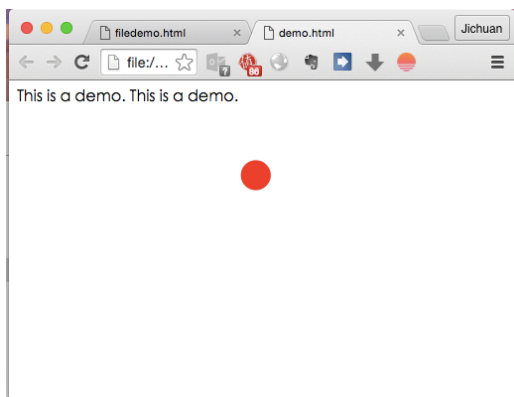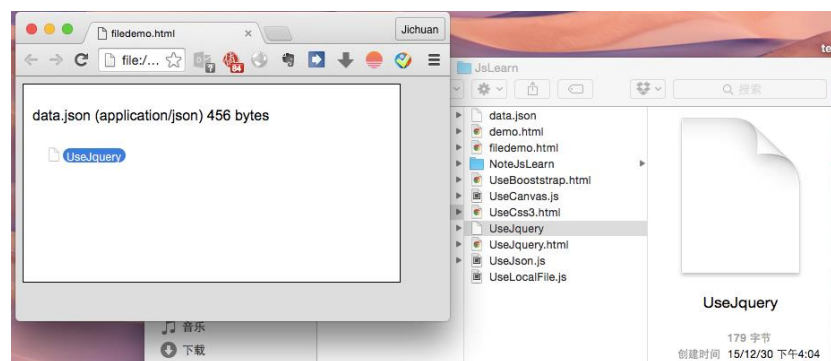
Animation (code)   Drag and Drop (code)

Everything about HTML: https://www.w3schools.com/html/

jQuery

- jQuery is the most popular and extensible JavaScript library.

- Huge resources of plug-in for almost any application you might have.

- Simple syntax.

- Include:

- ```
<script src="http://code.jquery.com/jquery-1.11.2.min.js"></script>
```

# jQuery

- Easy object accessing
- Easy event handling
- Easy Ajax

JavaScript Code

```javascript
$('#submit').on('click',function(e){
    $.ajax({
        url:'server.php',
        data:{item:$('#inputBox').val()},
        success:function(data){
            $('#displayBox').html(data);
        }
    });
});
```
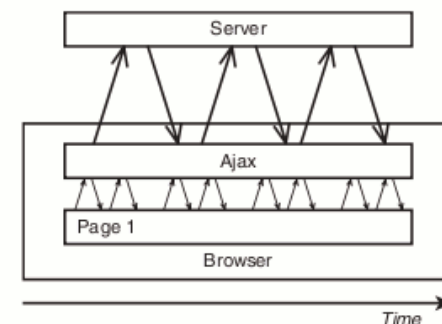
Html Code

```html
<div class="exampleDiv">
    <input type="text" id="inputBox" value=""/>
    <input type="button" id="submit" value="submit"/>
    <br/><br/>
    <textarea id="displayBox" style="height:200px;width:500px"></textarea>
</div>
```

Why Ajax?

- Traditional Design
    - Delay while loading new or revised pages
    - A whole page must be loaded including many unchanged items

Traditional client-server interaction
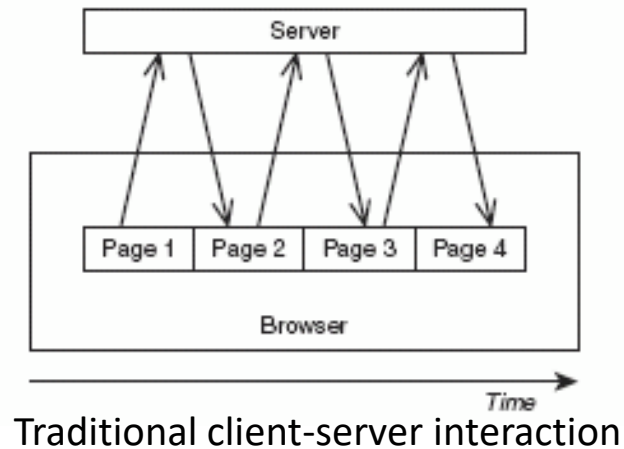
Ajax

- Ajax allows you to communicate with the server in the background.
- Ajax allows you to display the results on your page without having a page refreshing.
- Let your pages interact more smoothly with the user.
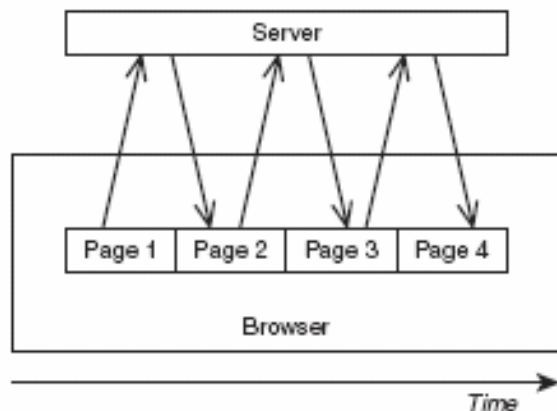
Traditional client-server interaction
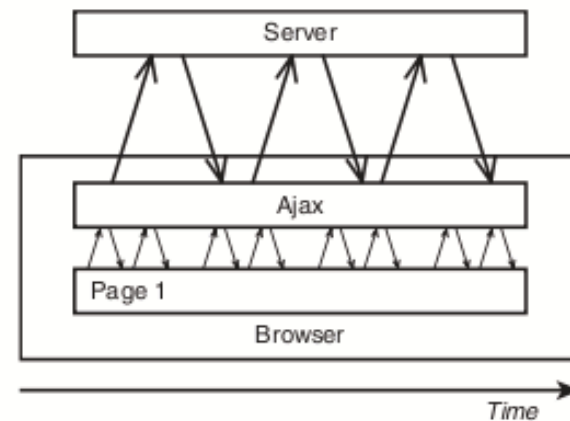
Ajax client-server interaction

Ajax - example

- Recommending queries **without** refreshing the screen

Ajax

- JQuery allows you to write Ajax in a few lines of code.

```
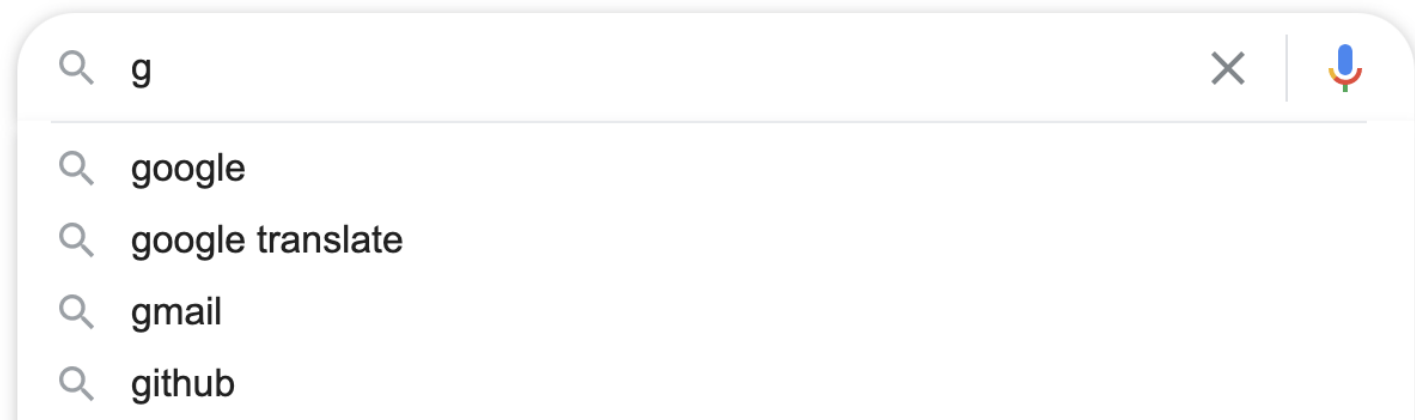$.ajax({
    type: "GET",        // request type
    url: 'www.google.com', // request url
    data: "q=ajax" // request data
}).done(function(data){
    …                    // callback to run after getting feedback
});
```

Development Tools

- Sublime Text, Notepad++, UtraEdit, VIM, Emac, Eclipse, Netbeans, Aptana, WebStorm, Visual Studio, Xcode

- IDE is strongly recommended.

- Free license for students
  https://www.jetbrains.com/community/education/#students

```
return (
  <View {...rest}>
    <Te
    🕸 TextInput          ReactNative (react-native.js, react-native)
    🕸 CreateIssue        (create-issue.js, src/views/create-issue)
    🕸 EnterServer        (enter-server.js, src/views/enter-server)
    ^↓ and ^↑ will move caret down and up in the editor >>         π
      maxInputHeight={0}
      editable={editable}
      autoCapitalize="sentences"
      multiline={true}
      underlineColorAndroid="transparent"
      placeholder="Description"
      value={description}
      onChangeText={this.props.onDescriptionChange} />
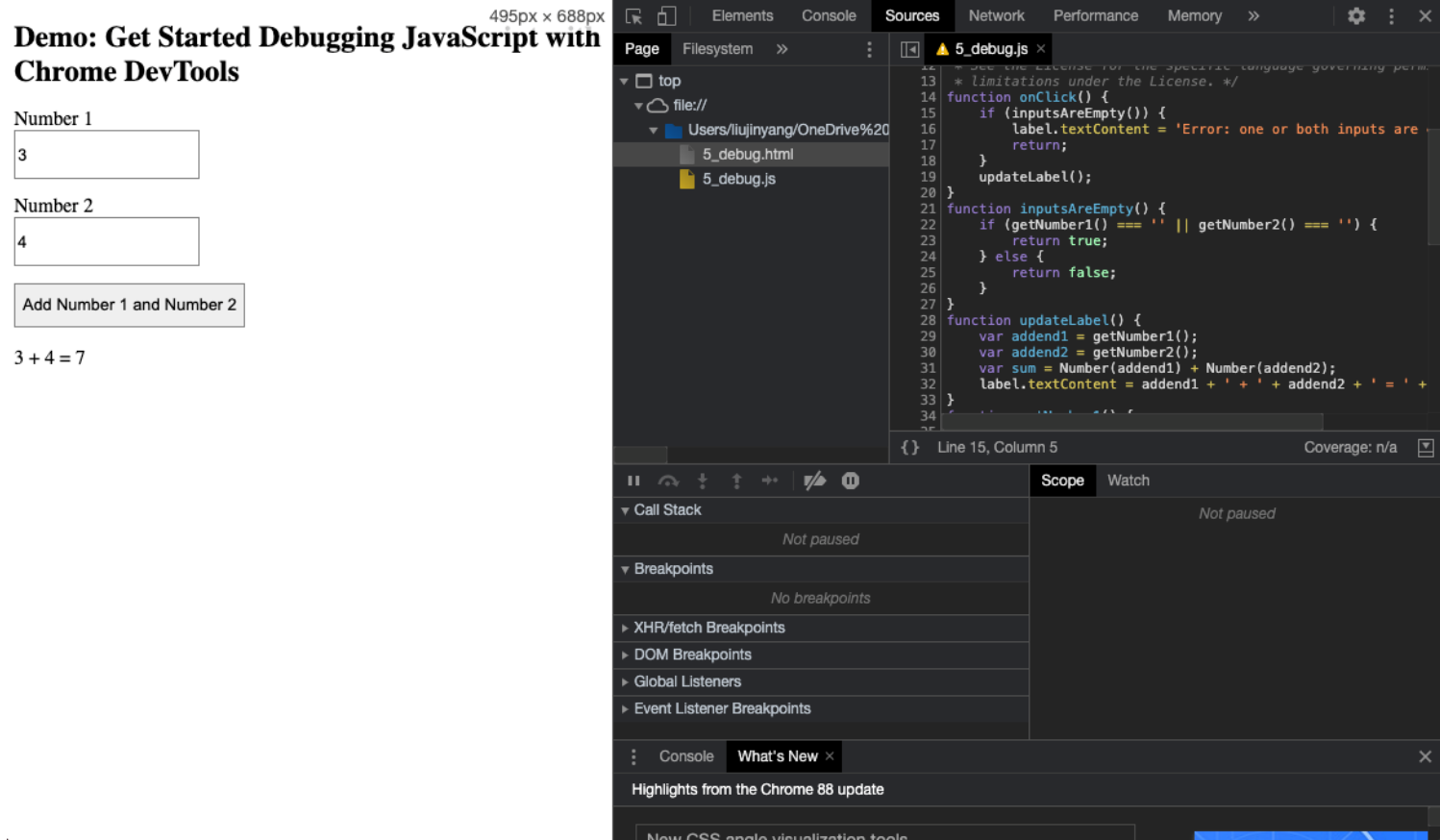  </View>
);
}
}
```

WS WebStorm

The smartest JavaScript IDE

Debug JavaScript

Debugging in Webstorm
https://blog.jetbrains.com/webstorm/2018/01/how-to-debug-with-webstorm/

Conclusions

❑ Employ modern Web technologies

❑ Separate files for integrated programming

❑ IDEs are recommended

Thank you!