JavaScript language fundamentals

Myths or Facts → Let us discover

JavaScript is code written in browsers!

JavaScript is programming language

JavaScript can be used to do server side code as well

JavaScript are very slow and unpredictable!

JavaScript make webpage look more beautiful!

JavaScript

- Is a scripting language developed by Netscape, and later standardized by W3C.
- It was originally called LiveScript.
- Used not only for web client and server side web programs, but also for iPhones, Adobe Photoshop, Adobe Flash action script to name a few.
- JavaScript on web page works with HTML and CSS to create a DHTML page.

Our focus

Scripting and Programming language

- Scripts are line of code that does not execute stand-alone. They run on browser (client-side) or application server (server-side) or on top of some other application.
- They are interpreted at runtime and are not compiled.
- Usually are loosely-typed language.
- Examples: JavaScript, JScript, VBScript, PHP

Is JScript not same as JavaScript?

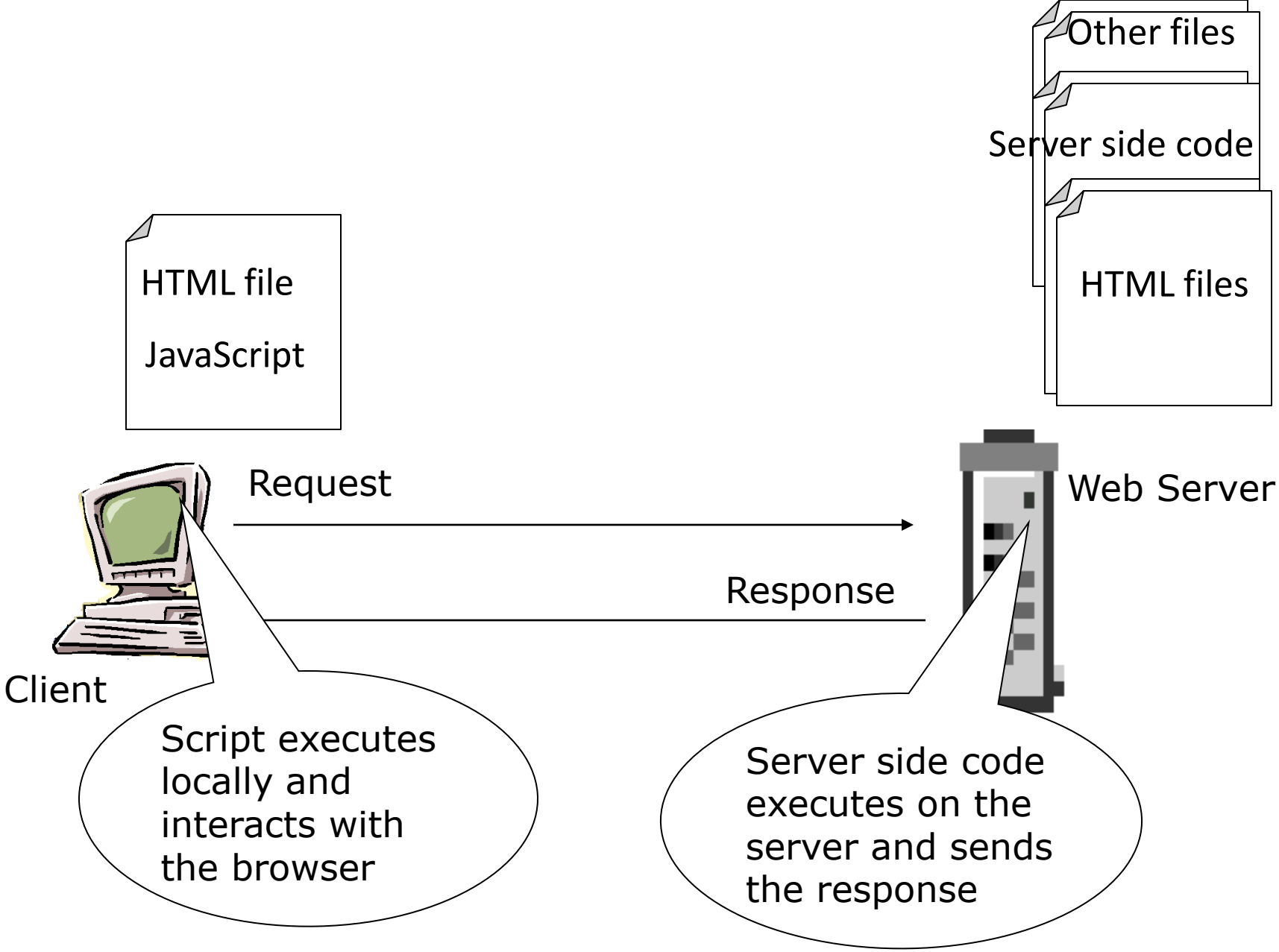
JScript is Microsoft version scripting language which is very similar to JavaScript

Microsoft produced 2 scripting languages- VBScript –(syntax similar to VB)and JScript

Oh! I thought it was VBScript

JavaScript in a Web Page

- To create more interactive pages- client side validations etc.
- To generate html dynamically.
- Event handling
- To enhance browser capabilities by giving it a better look – printing on status bar etc.
- Interaction with embedded components like applets and active x controls.



So JavaScripts on client side executes faster than server-side code.

Where will the code be written?

- Email format validation
- Password validation
- Changing the colour of the page based on user's input
- Displaying different page based on the user's role.
- Refreshing just part of the page

Client-side JavaScript code

Server-side code

Language Features

- Syntax similar to C++ and Java
- Case sensitive
- Loosely typed
- Interpreted
- Platform independent
- Object-based language
- Semicolon, as separator for multiple statements in the same line.

Object-based language

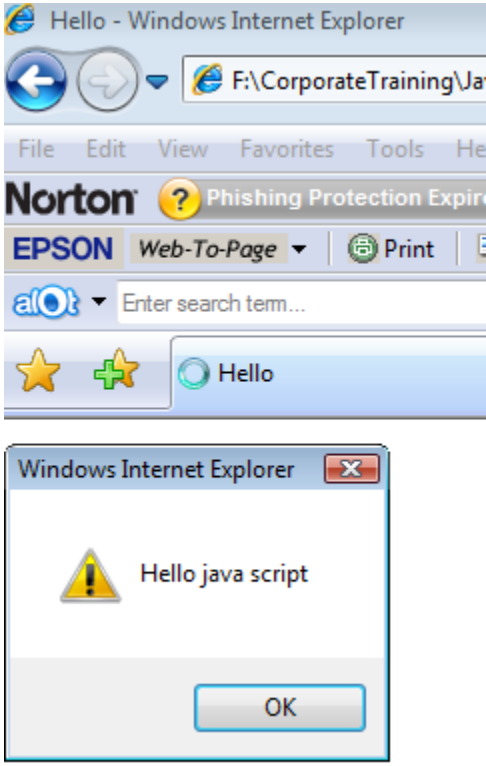
- Also called prototype-based object oriented language
- Object-based language
  - functions as object constructors and methods
  - prototypes instead of classes for inheritance.

More on this later

Simple Scripts in HTML

```
<HTML><HEAD><TITLE>Hello</TITLE></HEAD>
<BODY>
First java script code<br>
<SCRIPT type="text/javascript" >
//Java script single line comment
alert("Hello java script");
/* java script script
multi-line comment */
</SCRIPT>
</BODY>
</HTML>
```

popup



What will happen if you run this on a browser that does not support JavaScript?

NOSCRIPT and Hiding scripts

- Because some browsers don't support JavaScript it is wise to put the JavaScript code inside HTML commented tags.

```
<SCRIPT type="text/javascript" >
<!–
 alert("Hello java script")
-->
</SCRIPT>
<NOSCRIPT>
Java script is not supported
</NOSCRIPT>
```

- The text inside the **<NOSCRIPT>** tag will not be processed by the JavaScript aware browsers.

External Script

- Scripts can also be written in a separate file and can be referenced in a HTML file.

```
<HTML><HEAD><BODY>
<SCRIPT type="text/javascript"
SRC="jsfile.js">
</SCRIPT>
</BODY>
</HTML>
```

jsfile.js

```
alert("Hello");
```

Why would you want to write JavaScript in another file?

Path can be

1. Absolute path

   `http:://server1/get.jsp`

2. Root relative:

   `/scripts/jsfile.js`

3. Document relative

   `../scripts/jsfile.js`

Placeholders for scripts within HTML

- Inside head
  - only declarations. Declarations could for variables or functions.
  - No standalone executable statements must appear
- Inside the body
  - any statements can appear
  - standalone executable statements inside the body are interpreted in place where it appears.
- Along with the event handler
  - Script expression can be written as a value when an event like button click happens.

Data types

- Data types supported by Java Script are

a) Numeric – integer and floating point numbers (64 bit, IEE754 floating point)

```
alert(5+154e-2);
```

b) String-

```
alert("Hello") ;or
alert('Hello') ;
```

c) Boolean- **`true, false`**

```
alert('God gives every bird
 it's food but he doesn't throw
 it into it's nest');
```
gives me error

Hey! use escape sequences

```
alert('God gives every bird
  it\'s food but he doesn\'t
  throw it into it\'s nest');
```

Yes ! escape sequences can be used or you could also use double quote for string literal.

```
alert("God gives every bird it's
  food but he doesn't throw it
  into it's nest");
```

Variables and Data types

- Variable names must begin with a letter, under-score or $, subsequent characters can be a letter, under-score or $ or number.
- They can be assigned with proper value and used where ever appropriate . They are called data stores.
- To declare a variable:
  - `var x;`
  - `var x=1;` →declare and initialize
- Variables declaration is not compulsory in JavaScript. (If you don't declare a variable explicitly, JavaScript will declare it implicitly for you.)

Example

```
<HTML><HEAD>
<SCRIPT type="text/javascript”>
$x=false;
</SCRIPT>
</HEAD>
<BODY>
<SCRIPT type="text/javascript”>
alert($x==0);
</SCRIPT>
</BODY>
</HTML>
```

What do you think the alert box will display?

Find what alert box will display if $x is uninitialized?

Operators

- Arithmetic:

  `+ - * / % += -= *= /= %= ++ --`

- Logical:

  `& | ! && ||`

- Relational:

  `> >= < <= == != === !==`

- String concatenation: `+`
- Bit wise:

  `>> << >>> >>= <<= >>>=`

- Ternary: `?:`
- Conversion functions:

  `parseInt()` and **`parseFloat()`**

  To convert string to **`int`** and **`float`** respectively

Examples

Mixing up data types:

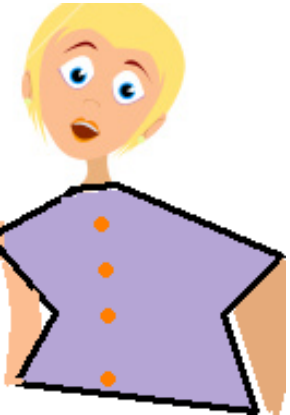
```
S="abc";
I=123;
alert(S+I); → abc123
B=true;
alert(S+B); → abctrue
alert(B+1); → 124
alert(5+154e-2 +" kgs"); →6.54 kgs
alert("Rs." +5+154e-2 ); →Rs .51.54
alert("34"==34);
alert(1<".23"); → true
alert(10*"55"); → 550
```

```
alert(10/"abc");      → NaN
alert(1==true);       → true
alert(1=="true");     → false
alert(5/0);           → Infinity
alert(true & "3");    → 1
alert(true & "a");    → 0
alert(10/"abc"==NaN); → false
```

Use **isNaN()**

Then how do we compare NaNs?

No we cannot, because ‘a’ is a string. We will look at the methods of String and there we will check out if we can do the achieve the same.



There is no char type in JavaScript. How do I increment chars. Can I do 'a'++?

Shift operators

- The shift left operator looks at the integer to the left of the operator as a 32-bit binary number.
- **>>** the SHIFT RIGHT operator
- **<<** the SHIFT LEFT operator
- **>>>** the UNSIGNED SHIFT RIGHT operator

```
s=2;
t=-2;
alert((s<<2) +" "+(s>>2)+ " "+(s>>>2));
alert((t<<2)+" "+ (t>>2)+ " "+ (t>>>2));
```

```
Result of popup:
8    0   0
-8   -1  1073741823
```

Find what happens when you shift beyond 32 bits?

`===` and `!==`

- **`alert("34"==34);`**
  - Returns true
- **`alert("34"===34);`**
  - Returns false
- **`===` and `!==`** are used for stricter comparisons based on types.
- Note that **`alert(34.0===34)`** returns true
- **`alert(true===1);`** returns false

Control statements

- Same as in C++ or Java
  - `if else`
  - `for`
  - `for..in`
  - `while`
  - `do .. while`
  - `switch`

Getting input from user

- **`String prompt(question,defaultanswer)`**
- **`Example: prompt(“what is your name”,””);`**
- A prompt box pops up. The user can enter some text and click either "OK" or "Cancel" to proceed after entering text.
- If the user clicks "OK" the box returns the input value.
- If the user clicks "Cancel" the box returns **`null`**.

Function

- Like other programming languages, in JavaScript also we can define a reusable code-block which will execute when ever it is called.
- A function can be defined inside **<head>** , **<body>** or in a external file and can be called from anywhere after it has been read.

- Syntax

```
function
  functionname(var1,var2,...,varX)
{
//some code
}
```

Example

```
<html><head>
<script type="text/javascript”>
<!--
function display(x){
alert(x);}
-->
</script>
</head>
<body>
<script>
<!--
display(“hello”);
-->
</script>
</body></html>
```

`display()` can be defined anywhere even after the function call

Calling a function

- The above function can be called as
  - **`display();`**
  - **`display("hello");`**
  - Or **`display`** with any number of arguments

```
function display(x){
if(x==null)
x="Greetings";
alert(x) ;
}
```

- You can also pass values to a function that does not take any arguments!

```
<body>
<script type="text/javascript”>
display("hello");
display();
function display(x)
{
if(x==null)
x="Greetings";
alert(x) ;
}
function display(){
alert("Greet") ;
}
</script>
</body>
```

No overloading possible. If overloaded functions are provided, only the last defined function is considered.

Prints **`Greet`** for both the calls

Local and Global variables

- All the variables that are not explicitly declared are global.
- Local variables are created using **`var`** inside the function

```
<html><head>
<script>
total=0;
function sum(){
y=20;
var x=10;
total=x+y;
}
function display(){
sum();
alert(total);
alert(y);
alert(x);
}
```

Global variable

Local variable

Error.

```
</script></head><body>
<script>
display();
</script>
</body></html>
```