INTRODUCTION TO JAVASCRIPT

Web Development

LEARNING OBJECTIVES

What is JavaScript?

How to add JavaScript to a Page?

Syntax of JavaScript

- Data Types
- Variables
- Statements
- Functions - Built-in functions, User-defined functions
- Events

WHAT IS JAVASCRIPT ?

- It is a programming language that enables you to interact with users such as dynamically updating content, control multimedia and animate images.
- It has some similarity in syntax with Java, but it is not related to Java.
- It is a scripting language which do not need to be fully compiled before execution.
- It was created in the year of 1995 and it is still evolving. It's standard is ECMAScript.
- In this module, we mainly focused at its basics and usage in Web API and DOM (usage in browser environment)

WHAT IS JAVASCRIPT ?

examples:

- validates forms
- react to events
- change the content of an HTML element dynamically
- control Web browser window

HOW TO USE JAVASCRIPT ?

How do we let the browser know in advance that it is not normal text but JavaScript ?

Example:

Using the <script> tag

For HTML5, this is optional

```
<!DOCTYPE HTML>
<html>
<head>
<title>My JavaScript Page</title>
</head>

<body>
<script type="text/javascript">
  alert("Welcome to my world!!!");
</script>
</body>
</html>
```

HOW TO USE JAVASCRIPT ?

You can enter JavaScript directly in both the <head> and <body> sections of the document.
JavaScript code can also be stored in a separate file and be included to the document.

As a general rule, place as much of your JavaScript (function definition) in the document head
Why ?

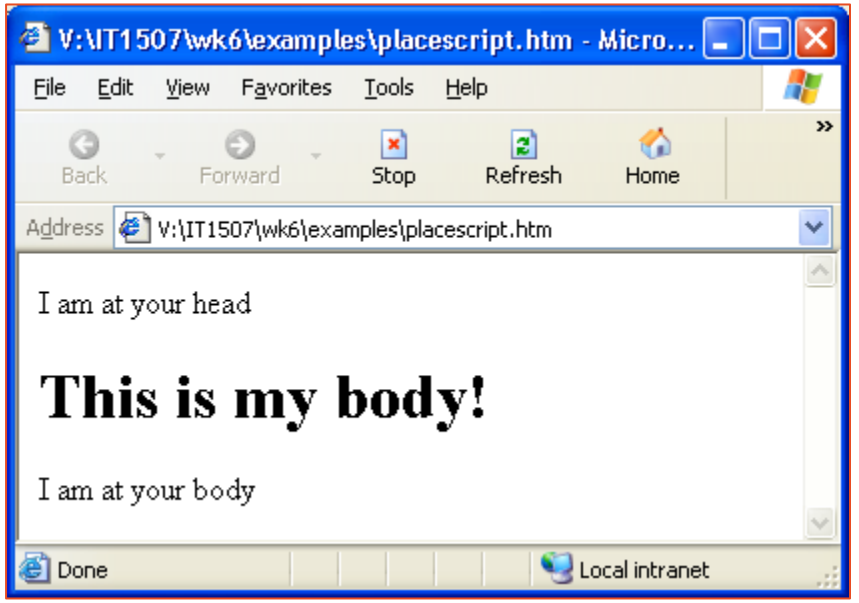
JavaScript is interpreted in the order in which it appears in the document. It is especially important when your document body need to perform tasks that depend on the scripts.

HOW TO USE JAVASCRIPT

- Sometime JavaScript codes are meant to be executed while web page is loaded. This codes should be ready and interpreted up front.
- For most of the JavaScript codes which is about manipulating the contents of a web page, you need to wait until the page is loaded.

WHERE TO PLACE JAVASCRIPT ?

```
<!DOCTYPE HTML>
<html>
<head>
<script type="text/javascript">
document.write("I am at your head");
</script>
</head>
<body>
<h1>This is my body!</h1>
<script type="text/javascript">
document.write("I am at your body");
</script>
</body>
</html>
```



JAVASCRIPT AS AN EXTERNAL FILE

```
<html>
<head>
<script type="text/javascript" src="hello.js">
</script>
</head>
<body>
<script>
sayhello();
</script>
</body>
</html>
```

```
function sayhello() {
  alert("Hello, what's up?");
  document.write("Hey, don't ignore me !");
}
```

hello.js

show

HOW TO HANDLE OLD-BROWSER ?

Browsers that do not support scripts will display the script as page content. To prevent browsers from displaying the code, the comment tag is used.

```
<script type="text/javascript">
<!-- Hide from incompatible browsers

    some statements

// Stop hiding -->
</script>
```

COMMENTS

Single and multi-line comments:

```
// This is a single-line comment
/* This is a
   multi-line
   comment. */
```

SYNTAX OF JAVASCRIPT

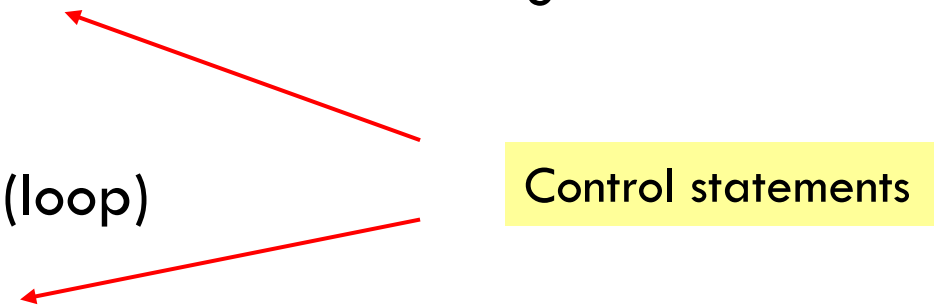
- JavaScript lines end with a semicolon.
- Always put the text within " ".
- Capital letters are different from lowercase letters.
- There are keywords that carry special meaning for JavaScript. Programmers are not allowed to use them for different purpose.

```
document.write("Hello World!");

Document.write(Hello World!)
```

WHAT DOES JAVASCRIPT HAVE?

- Variable – a place to hold information
- Statement
  - Assign value to a variable
  - Checking conditions for decision making
    - If….else
    - switch case
  - Repeating a task (loop)
    - do … while
    - for , for.. In



WHAT DOES JAVASCRIPT HAVE?

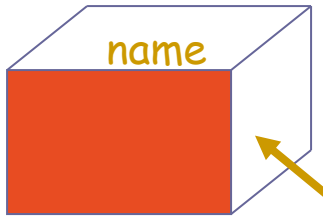
- Operators – for example: + - * / % = == ===
- Function – statements can be grouped to accomplished certain task(s)
- Event Handlers – will be triggered when certain events happen. For example:
  - onclick, onmouseover, onmouseout

WHAT DOES JAVASCRIPT HAVE?

- Built-in Objects – there some objects which have been defined and can be used readily. For example:
  - window, document, form, history, image, location, math, string, array, date ……

VARIABLES AND DATA TYPES

- What is variable ?



Hold data/information

- Data types

numbers ?
String ?
Boolean (true / false) ?
Undefined ?
Objects ? (e.g. Array, or self defined objects)

VARIABLE NAME

Rules and conventions when naming a variable:

- Identifiers must begin with an uppercase or lowercase ASCII letter, dollar sign ($), or underscore (_)
- You can use numbers in an identifier, but not as the first character
- You cannot include spaces in an identifier
- You cannot use reserved words for identifiers

KEYWORDS

Some keywords are reserved by browser

```
abstract as boolean break byte
case catch char class continue const
debugger default delete do double
else enum export extends false final
finally float for function goto if
implements import in instanceof int
interface is long namespace native new
null package private protected public
return short static super switch synchronized this
throw throws transient true try typeof use var void
volatile while with
```

Refer to http://www.ecma-international.org

DECLARING VARIABLES

To use a variable, you have to declare it first.

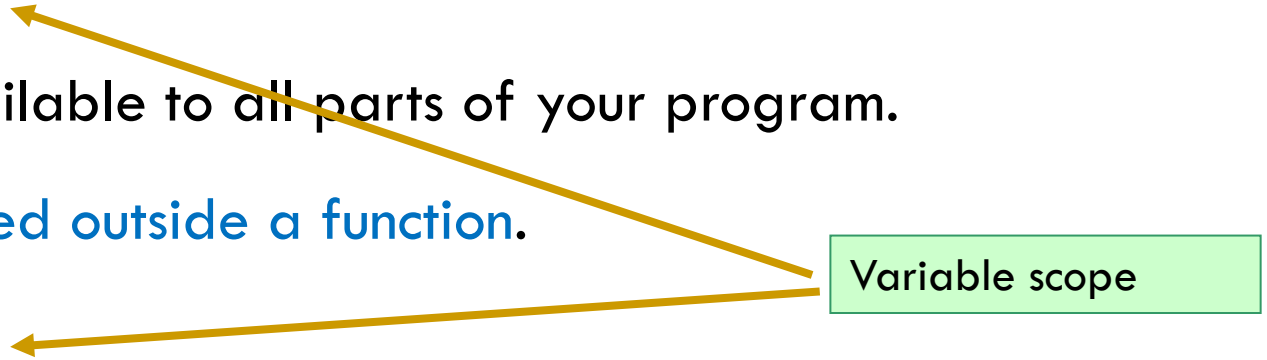
```
var variable_name;
```

Global variable

- it is known and available to all parts of your program.
- it should be declared outside a function.

Local variable

- it is known within a function.
- it is declared inside a function.



DECLARING VARIABLES (CONT.)

Examples: (declare and assign value to it)

```
var myVar="Hello World";

    var myVar=8;

    var myVar=4.56;

    var myVar=true;

    var myVar=null;
```

MODIFYING VARIABLES

You can change the variable's value at any point in a script:

- Use a statement that includes variable's name, followed by an equal sign, followed by the value to assign to the variable

  e.g. myNumber=8;

WHAT IS DATA TYPE ?

- Specific category of information that a variable contains
- Helps determine how much memory the computer allocates for data stored in the variable
- Data type also governs the kinds of operations that can be performed on a variable
- JavaScript is a loosely typed scripting language
  - Variable declarations do not declare the type of data
  - Type is determined dynamically as necessary

WHAT IS DATA TYPE ?

- JavaScript is a loosely typed scripting language

  Variables can have the same value == (to compare if same value)
  But are of different types === (to compare if same type and same value)

show

DATA TYPES (CONT.)

**To join (concatenate) two strings

- mode = degree +" "+ myFeeling
  (the value of mode is "extremely sleepy")

- String
  - Example: var str="happy birthday";

- Number
  - Example: var n=23.5;
    var n1=12e-3; // 0.012

- Boolean
  - Example: var answer=true;
    var guess=false;

DATA TYPES (CONT.)

- Array
  - Example:

```
var marks=[70, 83, 64, 55, 96]
var names=["ah mei", "ah john", "ah meng"]
```

- Object
  - Example:

```
var student={ name:"Ah Meng", adminNo:"153434T", gender:"Male"};
```

DATA TYPES (CONT.)

- Undefined

A variable that has not been assigned a value is of type undefined.

```
var nothing;

if ( typeof nothing === typeof undefined){
      alert("It is undefined");
}
else {
      alert("nothing is ="+nothing);
}
```

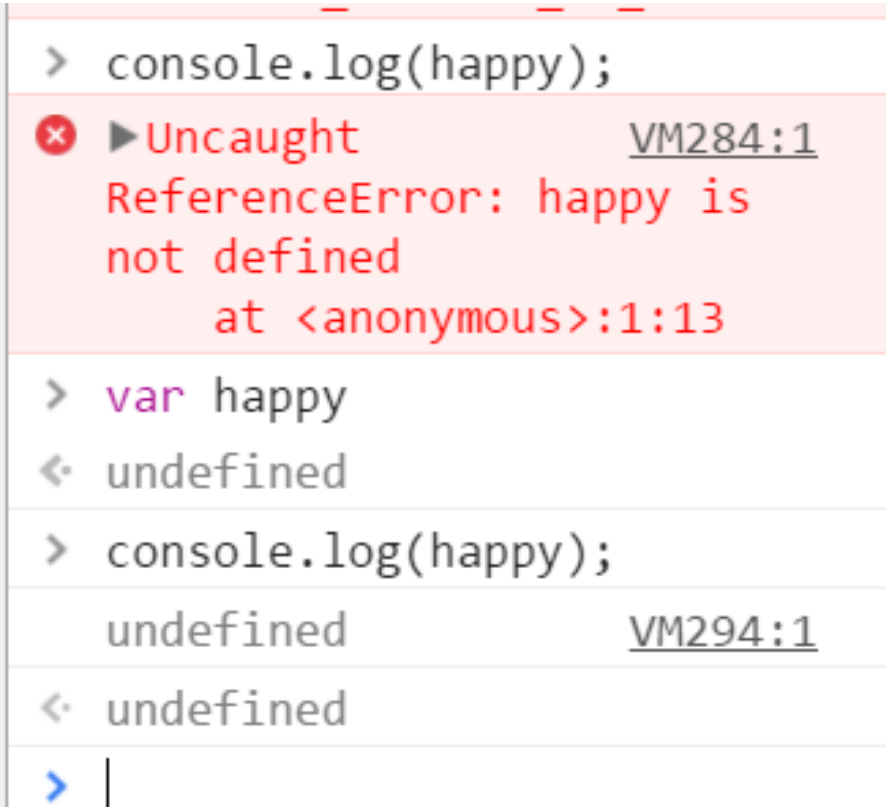
show

UNDEFINED VARIABLE VS NOT DEFINED REFERENCE ERROR

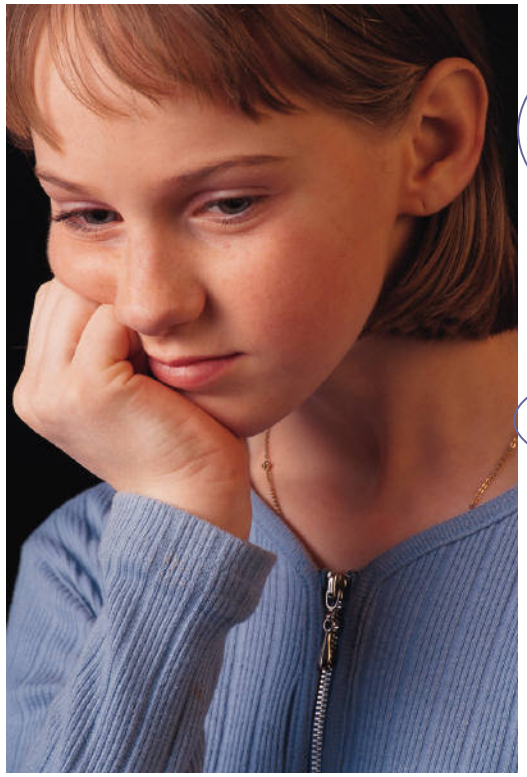
A variable which has been declare, e.g.

- var happy;
- with no value assigned is of ***type undefined***.

When access a "never declared" variable, a ***reference error*** will be caught; indicating it as not defined variable.

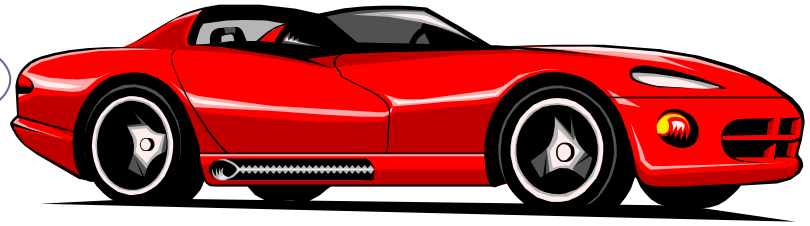


CONDITIONALS



if I have more than $100,000

Buy a car

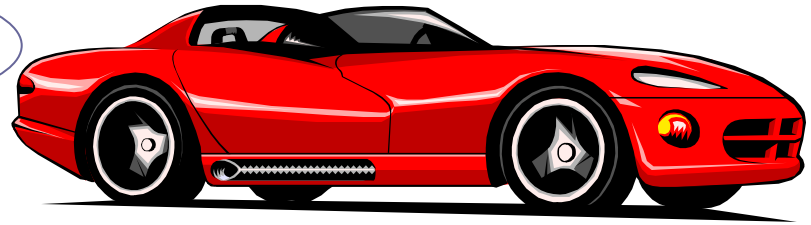


```
if ( money>100000 ) {
        buyCar=true;
}
```

CONDITIONALS

if I have more than $100,000

Buy a car



```
if ( money>100000 ) {
        buyCar=true;
}
else {
        buyToy=true;
}
```

else

get a toy

CONDITIONALS (MAKING DECISION)

There are other decision making statements such as,

- nested if
- switch .. Case

```
switch (day) {
      case "Sunday":
      seeMovie();
      break;
      case "Saturday":
            sleeplah();
            break;
      default:
            study();
}
```

```
if ( marks >= 50) {
    pass=true;
    if (marks>=90)
       grade="distinction";
     else if (marks>=80) {
          grade="A";
     }
     else if (marks>=70) {
          grade="B";
     }
     ……
}
else {
     pass=false;
}
```

SUMMARY

- What is JavaScript ?
  - Scripting language
  - Add interactivity to Web Page
- How to include JavaScript in a Web Page
  - <script> </script>
  - Head, body or a separate file
- Syntax of JavaScript
  - end with semicolon
  - Case sensitive
  - “text”
  - keywords

SUMMARY

- Variables and data types
  - Declare a variable (using keyword **var**)
  - number, string, boolean, array, object, undefined …
  - No need to specify type as of Java
- Operators

  + - * / = == === > <
- Conditionals
  - if, if-else, switch