

## 5. JavaScript Basics

### 5.1 An Introduction to JavaScript

- A Programming language for creating active user interface on Web pages
- JavaScript script is added in an HTML page, browser independent
- Add interactivity to Web pages and browser (dynamic, interactive)
- Provide instant feedback without CGI scripts and languages (client-side computing)

#### 5.1.1 Integrating JavaScript and HTML

- Provide active user interface to browsers
- User input information validation (checking FORM data) without using complex server-side scripts
- Display alert boxes and accept user input
- Display custom message
- Support object controls: forms, forms, buttons, and check boxes
- Generate clocks, calendars, timestamps
- Redirect Web page
- Interact with a Java applet on a Web page
- Handle window events
- Check types of browsers
- Open new windows
- Manage frames

#### 5.1.2 Object-Oriented JavaScript

- Object-Oriented Language
  - Methods (actions: subroutines, procedures, functions)
  - Properties (attributes: variables)

- Have states, behavior, and identity
- Instances of classes
- Examples of real-world objects:
  - Person objects: Jack, Paul, Jim; age, owner, job; change\_job()
  - File object: file\_name, size\_in\_bytes, last\_up\_date; print()
  - Controller object: DCMotorController, ACMotorController, PLC
  - Window, browser

### Role of an object

- Actor (active object), or
- Server (never operates upon other object), or
- Agent (both actor and server)

### JavaScript Client-Side Object Hierarchy

The Current Window (main object)

- Various window objects: self, **window**, parent, top
- Navigator object: **navigator**
  - Array of plug-in objects (version 1.1): plugins[ ]
  - Array of MIME type objects(version 1.1): mimeTypees[ ]
- Arrays of Window objects: frame[ ]
- Location object: **location**
- History object: **history**
- Document object: **document**
  - Array of form objects: forms[ ]
    - Array of HTML form element objects: elements[ ]
      - Button
      - Checkbox
      - FileUpload (version 1.1)
      - Hidden

- Password
- Radio
- Reset
- Select
  - Array of option objects: options[ ]
- Submit
- Text
- Textarea
- Array of anchor objects; anchor[ ]
  - Examples:
  - document.anchors[n]
  - document.anchors.length
- Array of link objects: links[ ]
- Array of image objects (version 1.1): images[ ]
- Array of applet objects (version 1.1): applets[ ]
  - Examples:
  - document.applets[n]
  - document.appletName
- Array of embedded objects (version 1.1): embeds[ ]

### 5.1.3 Features of JavaScript

- Case sensitive
- White space
- Semicolons termination (optional)
- Comments
  - `/* This is a comment. */`
  - `// This is a comment.`
- Keywords are all lower case
- Identifiers: variables, functions and label names
- Variables: declared and optionally initialized, with the "var" element
- Function names must be typed with a consistent capitalization

- Data types:
  - Numbers
  - Booleans
  - Strings
  - Objects
  - Arrays
  - Function and methods
  - Null and undefined
- Operators (C/C++/Java style): math, assignment, relational
- Statements: a sequence of statements to form a program
  - Declaration: var, function
  - Expression statements: formed by combining literal values and variables
    - $10+2$
    - $(n1 + n2)/2$
    - `Name = "Hello World"`
    - `x = Math.sqrt(10);`
    - `y++`
  - Compound statements
  - Empty statements
  - Label statements
  - Other statements
    - `break`
    - Decision making (if/else)
    - Control structure (break, continue, for, for/in, with, while, do/while, switch, case, default)
    - function, return
    - import, export
- Regular expressions support (matching and searching techniques defined in UNIX environment)

### 5.1.4 Language Rules

<SCRIPT> tag

Attributes:

LANGUAGE

Specifies the scripting language "JavaScript"

SRC

Gives the URL of an external script to be loaded and executed

ARCHIVE

Specifies the URL of a JAR file that contains the script specified by the SRC attributes

#### Where to place JavaScript Codes:

1. Place <SCRIPT> </SCRIPT> tags and code within <BODY> and </BODY> tags

2. Define JavaScript Functions and Variables within <HEAD> </HEAD> tags and invoke functions through event handler.

Functions

- Defining a function
- Calling a function

3. Include external JavaScript code for reusability

```
<HTML>
<SCRIPT language = "javascript" SRC = "src.js">
</SCRIPT>

<HTML>
<!-- firstjavacript.htm -->
<HEAD>
    <TITLE> First JavaScript </TITLE>
</HEAD>
<BODY BGCOLOR=WHITE>
<H1>
    <SCRIPT LANGUAGE=JAVASCRIPT TYPE="TEXT/JAVASCRIPT">

        document.write("Hello, JavaScript")

    </SCRIPT>
</H1>

</BODY>
</HTML>
```

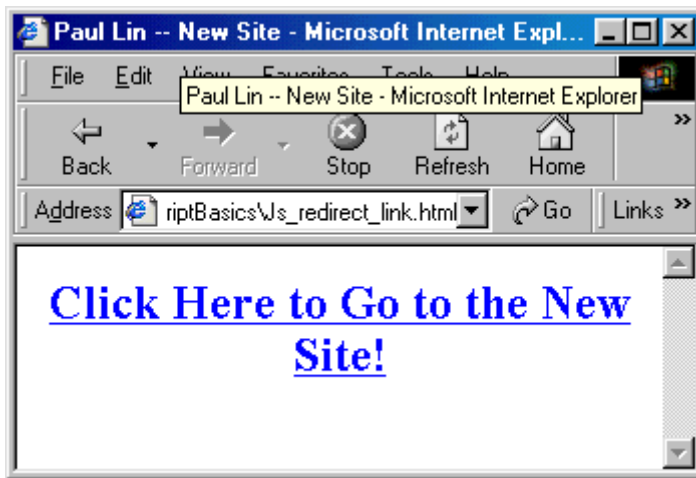
Example 5-1: Say "Hello, World" using JavaScript code.

```
<HTML>
<!-- helloworld.html -->
<HEAD>
    <TITLE>Hello World</TITLE>
</HEAD>
<BODY BGCOLOR=WHITE>
<H1>
    <SCRIPT LANGUAGE=JAVASCRIPT TYPE="TEXT/JAVASCRIPT">
        document.write("Hello, World!")
        // C++ style comment
        /* C style comment */
        // Display a pop up window to alert the user
        alert("Hello, World!")
    </SCRIPT>
</H1>
</BODY>
</HTML>
```



Example 5-2: Embed JavaScript in <A HREF> link.

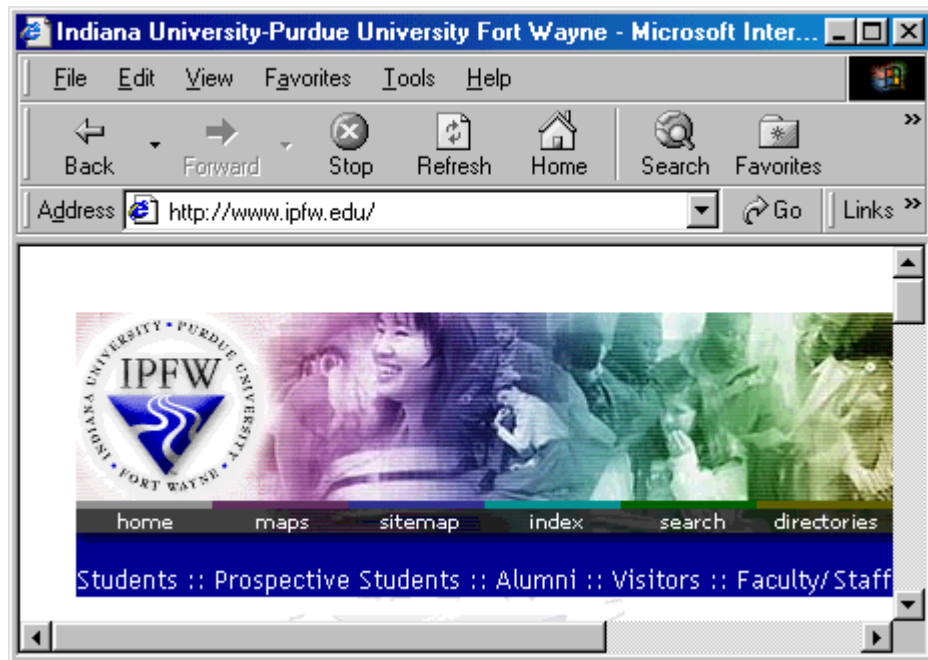
```
<HTML>
<!-- redirect_link.html
  Embed JavaScript in the HREF link tag
  1. If the browser does not support JavaScript it loads
  hello.html.html, otherwise, it loads helloworld.html which
  use alert() function to display a pop up window.
  2. if the browser support Javascript, the pop up window displays,
  then close click "OK" to close the alert window, finally
  it loads the hello.html.
-->
<HEAD>
  <TITLE>Paul Lin -- New Site </TITLE>
</HEAD>
<BODY BGCOLOR=WHITE>
<H2 ALIGN=CENTER> <A HREF="hello.html"
onClick="window.location='helloworld.html';
  return false" > Click Here to Go to the New Site!</A></H2>
</BODY>
</HTML>
```



Example 5-3; Redirect the user to another site using JavaScript `window.location()` function.

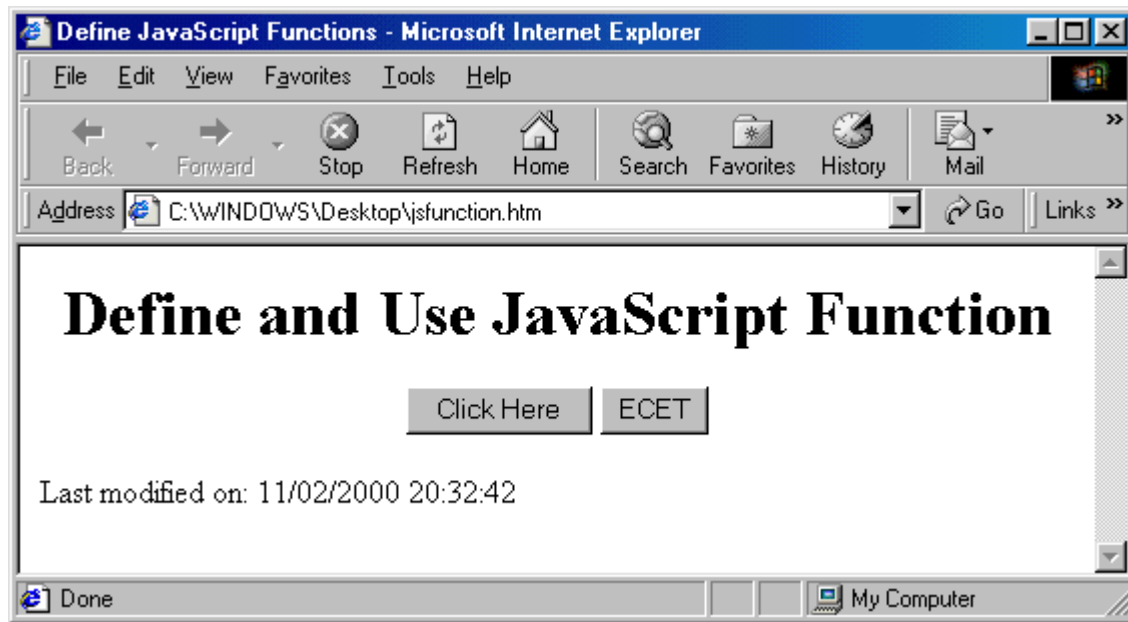
```
<HTML>
<!-- redirect.html -->
<HEAD>
  <TITLE>Redirection Using Javascript</TITLE>
  <SCRIPT LANGUAGE="JAVASCRIPT1.2" TYPE="TEXT/JAVASCRIPT">
    <!-- Hide script from old browsers
    window.location = "http://www.ipfw.edu"
    //window.location = "http://www.etcslipfw.edu/~lin"
    //window.location = "http://www.microsoft.com"
    //window.location="linhome.html"
    // End hiding script from old browsers -->
  </SCRIPT>
</HEAD>
<BODY BGCOLOR=WHITE>
<H2>Upgrade to require your Web Browser to have the latest version of
JavaScript!</H2>
</BODY>
</HTML>
```





#### Example 5-4: Create and use JavaScript functions

```
<HTML>
<!-- Jsfunction.html -->
<HEAD>
<TITLE> Define JavaScript Functions </TITLE>
<SCRIPT LANGUAGE = "JavaScript">
    function Greeting(){alert("Hello World!");}
    function Say(message){alert(message)}:
</SCRIPT>
</HEAD>
<H1 ALIGN = "CENTER"> Define and Use JavaScript Function </H1>
<DIV ALIGN = "CENTER">
<FORM>
    <INPUT TYPE="BUTTON" VALUE = "Click Here" onClick="Greeting()">
    <INPUT TYPE="BUTTON" VALUE = "ECET" onClick="Say('Electrical and
Computer Engineering Technology')">
</FORM>
</DIV>
<SCRIPT>
    document.write("Last modified on: " + document.lastModified);
</SCRIPT>
</BODY>
</HTML>
```



**Include external JavaScript code for reusability**

```
<HTML>
<SCRIPT language = "javascript" SRC = "src.js">
</SCRIPT>
```

```
<HEAD>
    <SCRIPT> </SCRIPT>
</HEAD>
```

// Non-script Option:

```
<BODY>
    <SCRIPT>
        Statements
    </SCRIPT>

    <NOSCRIPT>
        [JavaScript is not supported]
</BODY>
```