Lecture 7: Dynamic Web Pages

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Introduction

• **Dynamic Web pages** can be defined as:
  – (1) Web pages containing dynamic content (e.g., images, text, form fields, etc.) that can change/move without the Web page being reloaded.
  – (2) Web pages that are produced by server-side programs, frequently based on parameters from an HTML form.
Client-side dynamic pages

• Web pages that adhere to the first definition are often called Dynamic HTML (DHTML) pages.

• Client-side languages like JavaScript are frequently used to produce these types of dynamic Web pages.
Client-side dynamic pages

- Web pages that adhere to the second definition are often created with the help of server-side languages such as PHP, Perl, and other languages.
Client-side dynamic pages

• Client-side dynamic content is generated on the client's computer.
Client-side dynamic pages

• The problems with client-side dynamic pages are:
  – Some browsers do not support the language or they do not support all aspects of the language.
  – Some users have scripting languages disabled in their browsers due to possible security threats.
JavaScript

- A scripting programming language based on the concept of prototypes.
- One major use of web-based JavaScript is to write functions that are embedded in or included from HTML pages and interact with the Document Object Model (DOM) of the page to perform tasks not possible in HTML alone.
JavaScript

• Outside of the Web, JavaScript interpreters are embedded in a number of tools.
  – Adobe Acrobat and Adobe Reader support JavaScript in PDF files.
  – The Mozilla platform, which underlies several common web browsers, uses JavaScript to implement the user interface and transaction logic of its various products.
JavaScript Syntax

• The JavaScript syntax was influenced by several programming languages, including Java.
JavaScript Syntax

• **Variables:** Local variable v.s. Global variable
  – Here is an example of variable declarations and global values:

```javascript
x = 0; // A global variable;
var y = 'Hello!'; // Another global variable

function f(){
  var z = 'foxes'; // A local variable;
twenty = 20; // Another global
  return x; // We can use x here because it is global
}
// The value of z is no longer available
```
JavaScript Syntax

• Basic data types
  – Number: e.g., “346.56”
  – Arrays
  – Strings: e.g., “class”
  – Objects
JavaScript Syntax

• Operators
  – For example: the '+' operator is used for
    • string concatenation
    • arithmetic addition

```javascript
// Concatenate 2 strings
var a = 'This';
var b = ' and that';
alert(a + b); // displays 'This and that'

// Add two numbers
var x = 2;
var y = 6;
alert(x + y); // displays 8
```
JavaScript Syntax

• Control structures
  – For example: “If ... Else”

```javascript
if (expr) {
    statements;
} else if (expr) {
    statements;
} else {
    statements;
}
```

```javascript
if (A) {
    Print “A”;
} else if (B) {
    Print “B”;
} else {
    Print “not A or B”;  
}
```
JavaScript Syntax

• A function is a block with a (possibly empty) argument list that is normally given a name. A function may give back a return value.

function function-name(arg1, arg2, arg3) {
    statements;
    return expression;
}

function add_two_numbers (x, y) {
    var z = x+y;
    return z;
}
Reference for JavaScript

Ajax

• Ajax is a newer web development technique for creating client-side dynamic Web pages.

• **Ajax**, shorthand for *Asynchronous JavaScript and XML*, is a web development technique for creating interactive web applications.

• Like DHTML, Ajax is not a technology in itself, but a term that refers to the use of a group of technologies together.
Ajax

• Ajax can be used for a multitude of tasks
  – updating or deleting records;
  – expanding web forms;
  – returning simple search queries;
  – editing category trees
Pros of Ajax

• **Bandwidth utilization**
  – By generating the HTML locally within the browser, and only bringing down JavaScript calls and the actual data, Ajax web pages can appear to load quickly since the payload coming down is much smaller in size.

• **Increased Interactivity**
  – Generally only small requests need to be sent to the server, and relatively short responses are sent back. This permits the development of more interactive applications featuring more responsive user interfaces due to the use of DHTML techniques.
Ajax

- Google Maps is an example of a web application that uses Ajax techniques.
- Like other Google web applications, a large amount of JavaScript was used to create Google Maps. As the user drags the map, the grid squares are downloaded from the server and displayed to the user.
Server-side dynamic pages

- Server-side dynamic content:
  - The browser on client sends an request.
  - The server retrieves the requested script or program.
  - The server executes the script or program which typically outputs an HTML Web page.
  - The server sends the HTML output to the client's browser.
DOM

• **Document Object Model (DOM)** is a description of how an HTML or XML document is represented in a tree structure.

• The tree-based implementation requires that the entire content of a document be parsed and stored in memory.
DOM

DOM Inspector inspecting Wikipedia's main page