Session 9 - Java Script

Adding Dynamic Content
to Web Pages

Agenda

- **Generating HTML Dynamically**
- **Monitoring User Events**
- **Basic JavaScript Syntax**
- **Applications**
  - Using JavaScript to customize Web pages
  - Using JavaScript to make pages more dynamic
  - Using JavaScript to validate CGI forms
  - Using JavaScript to manipulate HTTP cookies
  - Using JavaScript to interact with and control frames
  - Controlling applets and calling Java from JavaScript
  - Accessing JavaScript from Java

Generating HTML Dynamically

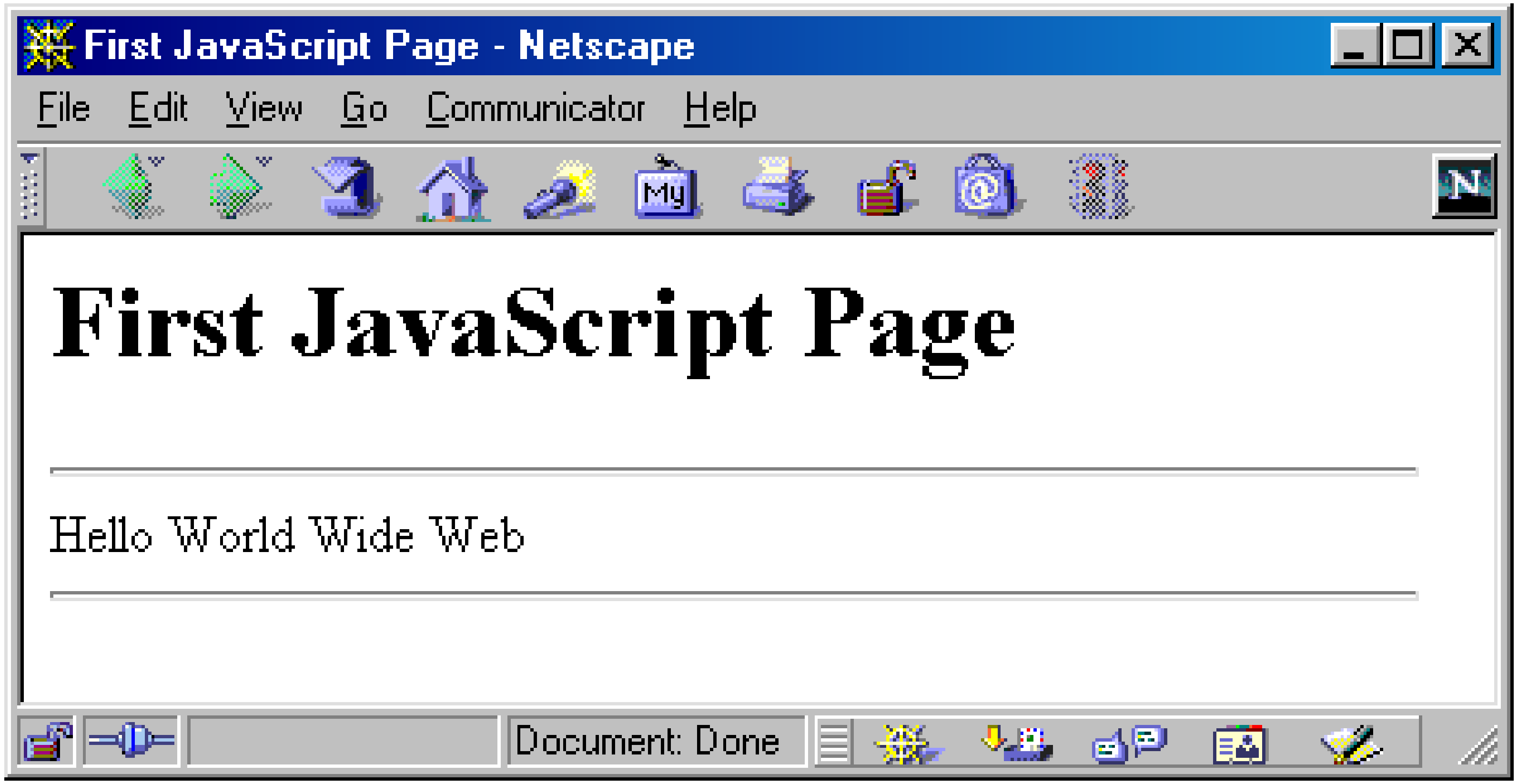
- **Idea**
  - Script is interpreted as page is loaded, and uses `document.write` or `document.writeln` to insert HTML at the location the script occurs
- **Template**

```
...
<BODY>
Regular HTML

<SCRIPT TYPE="text/javascript">
<!--
Build HTML Here
// -->
</SCRIPT>

More Regular HTML
</BODY>
```

A Simple Script

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0//EN">
<HTML>
<HEAD>
  <TITLE>First JavaScript Page</TITLE>
</HEAD>

<BODY>
<H1>First JavaScript Page</H1>

<SCRIPT TYPE="text/javascript">
<!--
document.write("<HR>");
document.write("Hello World Wide Web");
document.write("<HR>");
// -->
</SCRIPT>

</BODY>
</HTML>
```

Simple Script, Result


First JavaScript Page - Netscape
File Edit View Go Communicator Help
Document: Done

First JavaScript Page

Hello World Wide Web

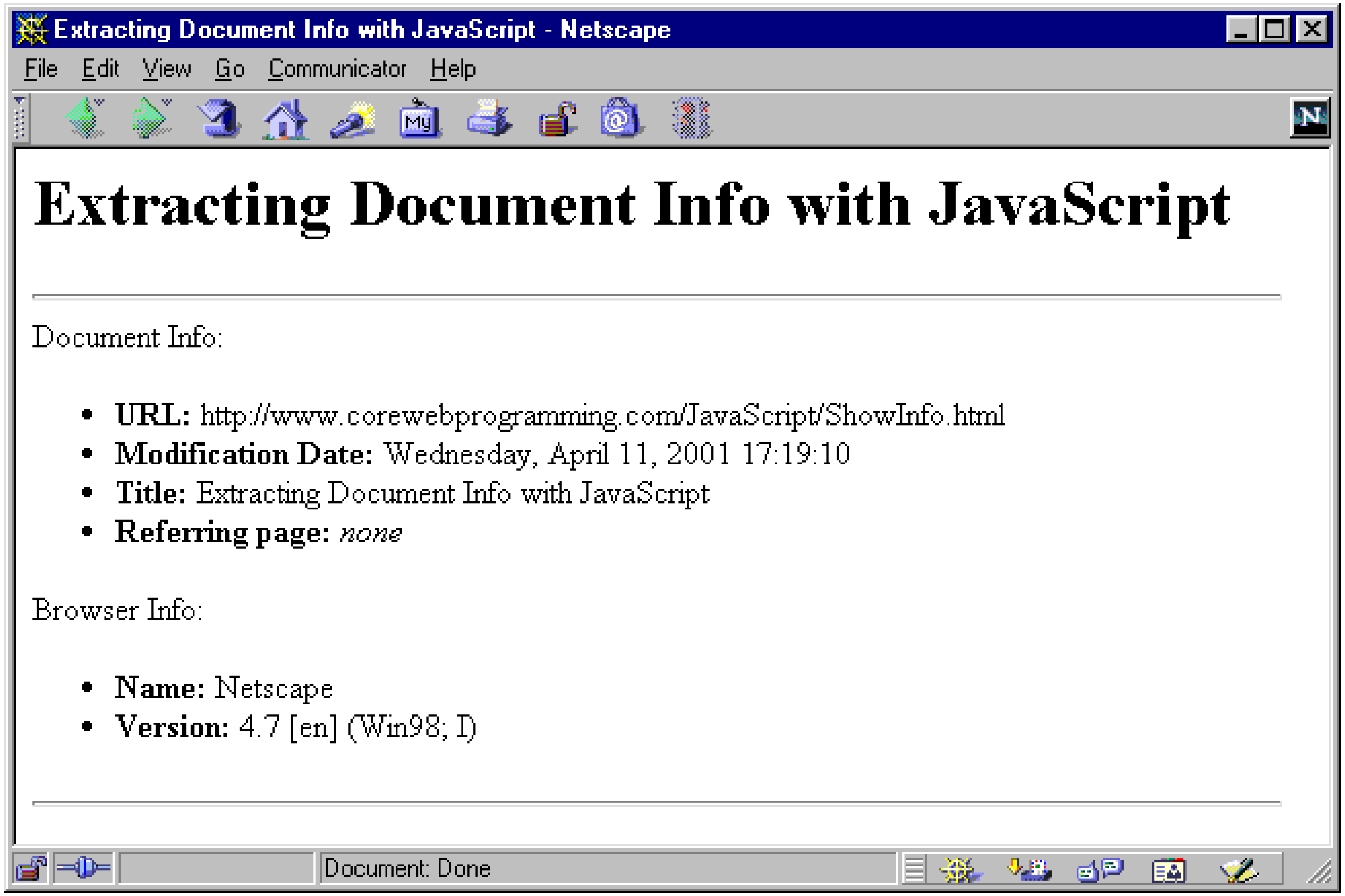
Extracting Document Info with JavaScript, Example

```
<HTML>
<HEAD>
  <TITLE>Extracting Document Info with JavaScript</TITLE>
</HEAD>
<BODY BGCOLOR="WHITE">
<H1>Extracting Document Info with JavaScript</H1>
<HR>

<SCRIPT TYPE="text/javascript">
<!--

function referringPage() {
  if (document.referrer.length == 0) {
    return("<I>none</I>");
  } else {
    return(document.referrer);
  }
}
```

Extracting Document Info with JavaScript, Example, cont.

```
...
document.writeln
  ("Document Info:\n" +
   "<UL>\n" +
   "  <LI><B>URL:</B> " + document.location + "\n" +
   "  <LI><B>Modification Date:</B> " + "\n" +
          document.lastModified + "\n" +
   "  <LI><B>Title:</B> " + document.title + "\n" +
   "  <LI><B>Referring page:</B> " + referringPage() + "\n" +
   "</UL>");
document.writeln
  ("Browser Info:" + "\n" +
   "<UL>" + "\n" +
   "  <LI><B>Name:</B> " + navigator.appName + "\n" +
   "  <LI><B>Version:</B> " + navigator.appVersion + "\n" +
   "</UL>");
// -->
</SCRIPT>

<HR>
</BODY>
</HTML>
```

Extracting Document Info with JavaScript, Result


Extracting Document Info with JavaScript - Netscape
File Edit View Go Communicator Help
Document: Done

Extracting Document Info with JavaScript

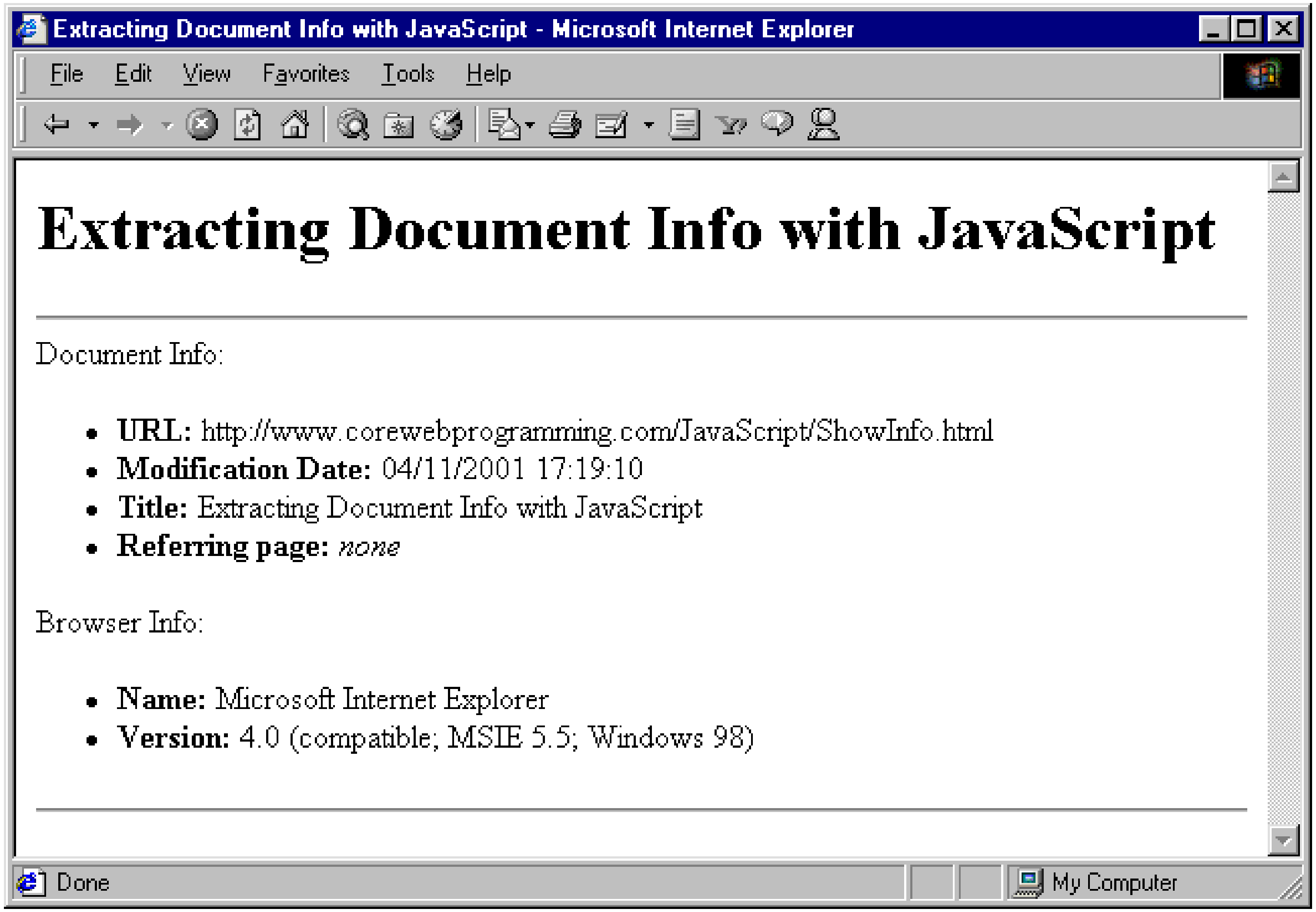
Document Info:

- **URL:** http://www.corewebprogramming.com/JavaScript/ShowInfo.html
- **Modification Date:** Wednesday, April 11, 2001 17:19:10
- **Title:** Extracting Document Info with JavaScript
- **Referring page:** *none*

Browser Info:

- **Name:** Netscape
- **Version:** 4.7 [en] (Win98; I)

Extracting Document Info with JavaScript, Result


Extracting Document Info with JavaScript - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Done
My Computer

Extracting Document Info with JavaScript

Document Info:

- **URL:** http://www.corewebprogramming.com/JavaScript/ShowInfo.html
- **Modification Date:** 04/11/2001 17:19:10
- **Title:** Extracting Document Info with JavaScript
- **Referring page:** *none*

Browser Info:

- **Name:** Microsoft Internet Explorer
- **Version:** 4.0 (compatible; MSIE 5.5; Windows 98)

Multi-Browser Compatibility

1. Use Language Attribute

```
<SCRIPT LANGUAGE="JavaScript">
<!--
languageVersion = "1.0";
// -->
</SCRIPT>

<SCRIPT LANGUAGE="JavaScript1.1">
<!--
languageVersion = "1.1";
// -->
</SCRIPT>

...

<SCRIPT LANGUAGE="JavaScript1.5">
<!--
languageVersion = "1.5";
// -->
</SCRIPT>
```

Note: Don’t include that attribute `TYPE="text/javascript"`

Multi-Browser Compatibility, cont.

2. **Use Vendor/Version Info**
   - navigator.appName
   - navigator.appVersion

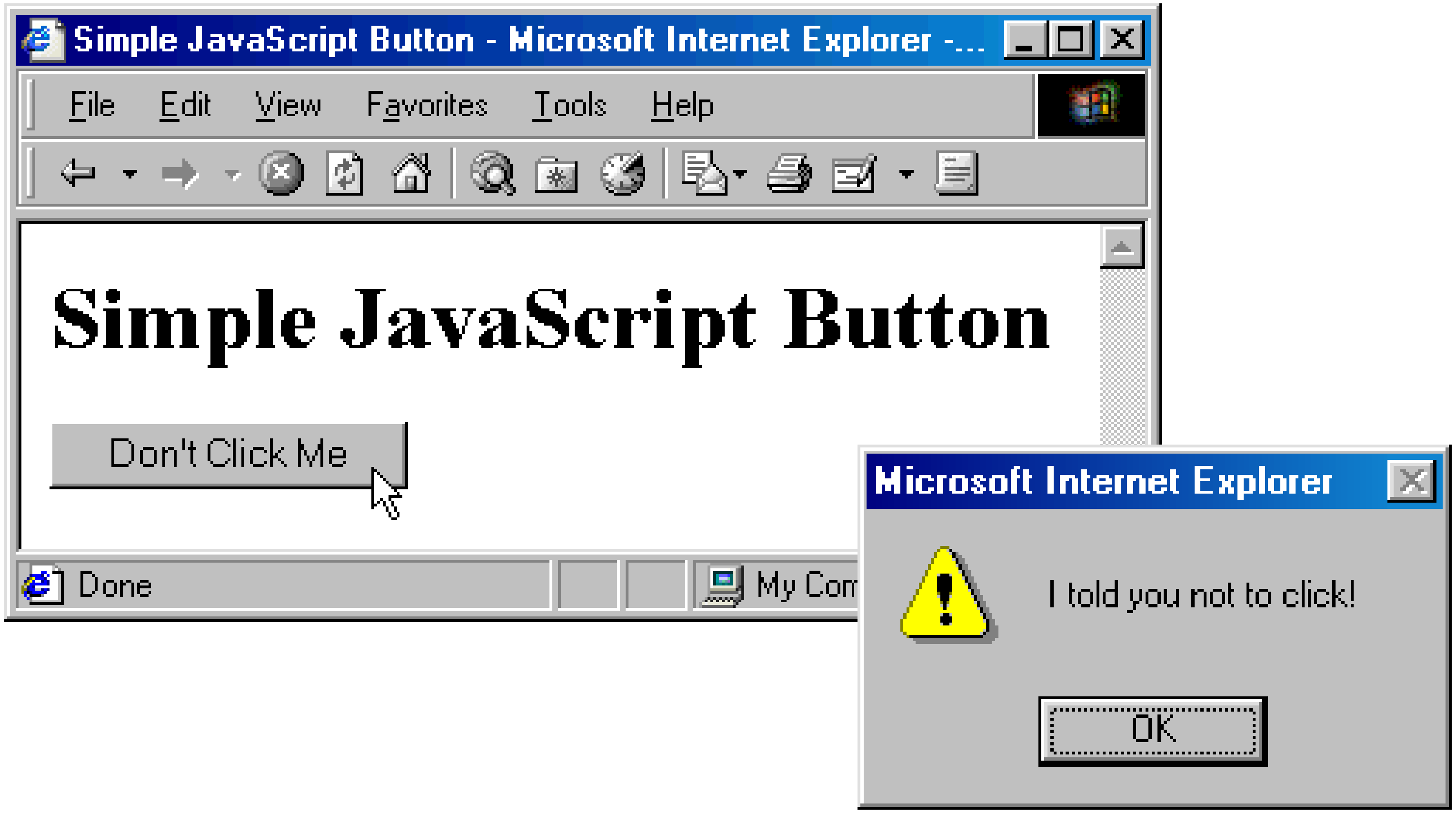
Monitoring User Events

- **Use Various onXxx Attributes**
  - onClick
  - onLoad
  - onMouseOver
  - onFocus
  - etc.

User Events, Example

```
<HTML>
<HEAD>
  <TITLE>Simple JavaScript Button</TITLE>
<SCRIPT TYPE="text/javascript">
<!--
function dontClick() {
  alert("I told you not to click!");
}
// -->
</SCRIPT>
</HEAD>

<BODY BGCOLOR="WHITE">
<H1>Simple JavaScript Button</H1>

<FORM>
  <INPUT TYPE="BUTTON"
         VALUE="Don't Click Me"
         onClick="dontClick()">
</FORM>
</BODY>
</HTML>
```

User Events, Result


Simple JavaScript Button - Microsoft Internet Explorer -...
File Edit View Favorites Tools Help
Done
My Com
Microsoft Internet Explorer
OK

Simple JavaScript Button

Don't Click Me

I told you not to click!

JavaScript Syntax: Dynamic Typing

- **Idea**
  - Like Lisp, values are typed, not variables
  - A value is only checked for proper type when it is operated upon
- **Example**

```
var x = 5; // int
x = 5.5; // float
x = "five point five"; // String
```

JavaScript Syntax: Function Declarations

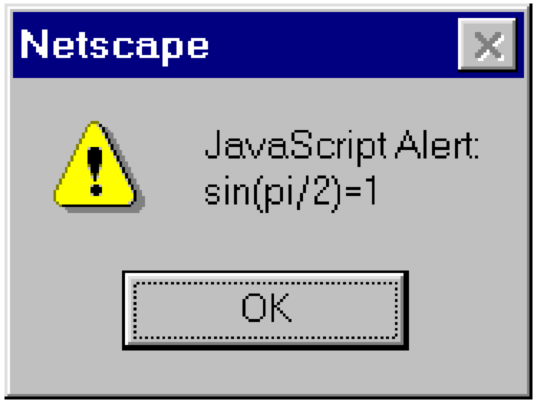
1. **Declaration Syntax**
   - Functions are declared using the function reserved word
   - The return value is not declared, nor are the types of the arguments
   - Examples:

```
function square(x) {
  return(x * x);
}

function factorial(n) {
  if (n <= 0) {
    return(1);
  } else {
    return(n * factorial(n - 1));
  }
}
```

JavaScript Syntax: Function Declarations, cont.

2. **First Class Functions**
   - Functions can be passed and assigned to variables
   - Example

```
var fun = Math.sin;
alert("sin(pi/2)=" + fun(Math.PI/2));
```


Netscape

JavaScript Alert:
sin(pi/2)=1

JavaScript Syntax: Objects and Classes

1. Fields Can Be Added On-the-Fly

- Adding a new property (field) is a simple matter of assigning a value to one
- If the field doesn’t already exist when you try to assign to it, JavaScript will create it automatically.
- For instance:

```
var test = new Object();
test.field1 = "Value 1"; // Create field1 property
test.field2 = 7; // Create field2 property
```

JavaScript Syntax: Objects and Classes, cont.

2. You Can Use Literal Notation

– You can create objects using a shorthand “literal” notation of the form

```
{ field1:val1, field2:val2, ... , fieldN:valN }
```

– For example, the following gives equivalent values to `object1` and `object2`

```
var object1 = new Object();
object1.x = 3;
object1.y = 4;
object1.z = 5;

object2 = { x:3, y:4, z:5 };
```

JavaScript Syntax: Objects and Classes, cont.

3. **The "for/in" Statement Iterates Over Properties**
   - JavaScript, unlike Java or C++, has a construct that lets you easily retrieve all of the fields of an object
   - The basic format is as follows:

```
for(fieldName in object) {
  doSomethingWith(fieldName);
}
```

   - Also, given a field name, you can access the field via `object["field"]` as well as via `object.field`

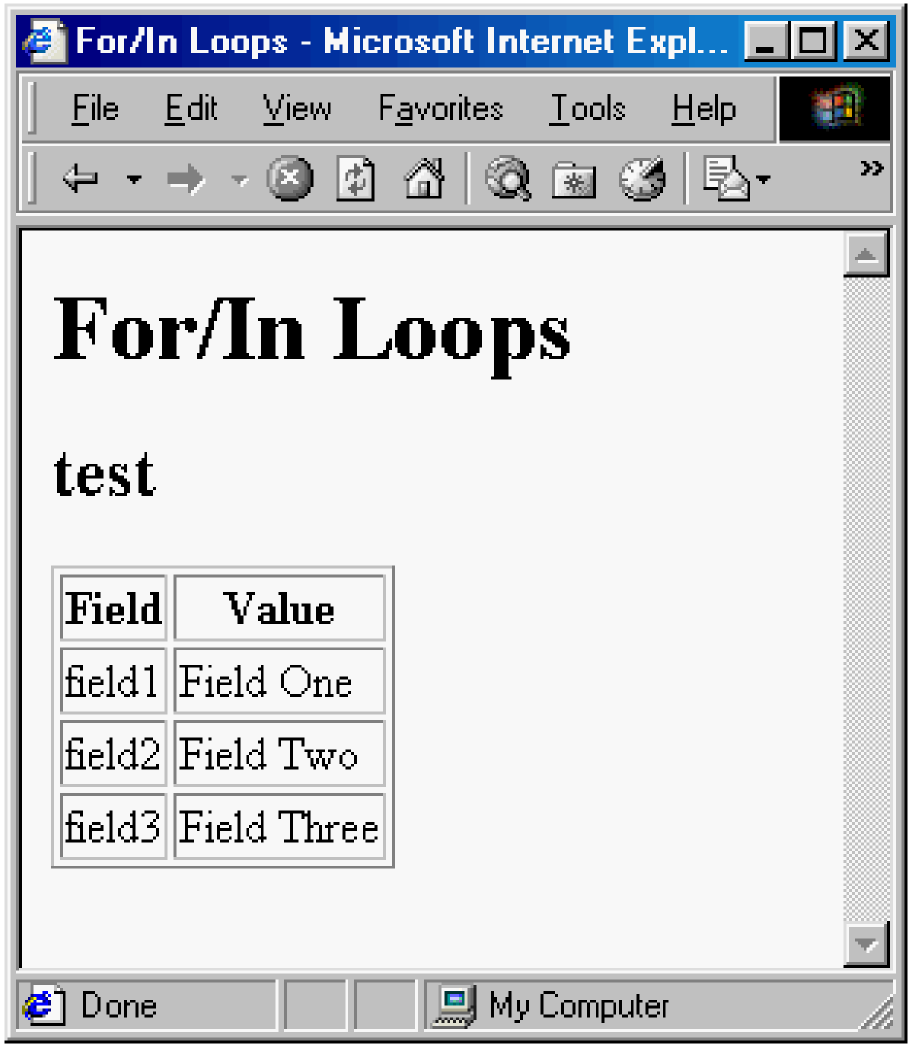
Field Iteration, Example

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0
   Transitional//EN">
<HTML>
<HEAD>
  <TITLE>For/In Loops</TITLE>

<SCRIPT TYPE="text/javascript">
<!--

function makeObjectTable(name, object) {
  document.writeln("<H2>" + name + "</H2>");
  document.writeln("<TABLE BORDER=1>\n" +
                   "  <TR><TH>Field<TH>Value");
  for(field in object) {
    document.writeln ("  <TR><TD>" + field +
                      "<TD>" + object[field]);
  }
  document.writeln("</TABLE>");
}
// -->
</SCRIPT>
```

Field Iteration, Example

```
...
</HEAD>
<BODY BGCOLOR="WHITE">
<H1>For/In Loops</H1>

<SCRIPT TYPE="text/javascript">
<!--

var test = new Object();
test.field1 = "Field One";
test.field2 = "Field Two";
test.field3 = "Field Three";
makeObjectTable("test", test);

// -->
</SCRIPT>

</BODY>
</HTML>
```

Field Iteration, Result


For/In Loops - Microsoft Internet Expl...
File Edit View Favorites Tools Help
Done
My Computer

For/In Loops

test

Field	Value
field1	Field One
field2	Field Two
field3	Field Three

The for/in statement iterates over object properties

JavaScript Syntax: Objects and Classes, cont.

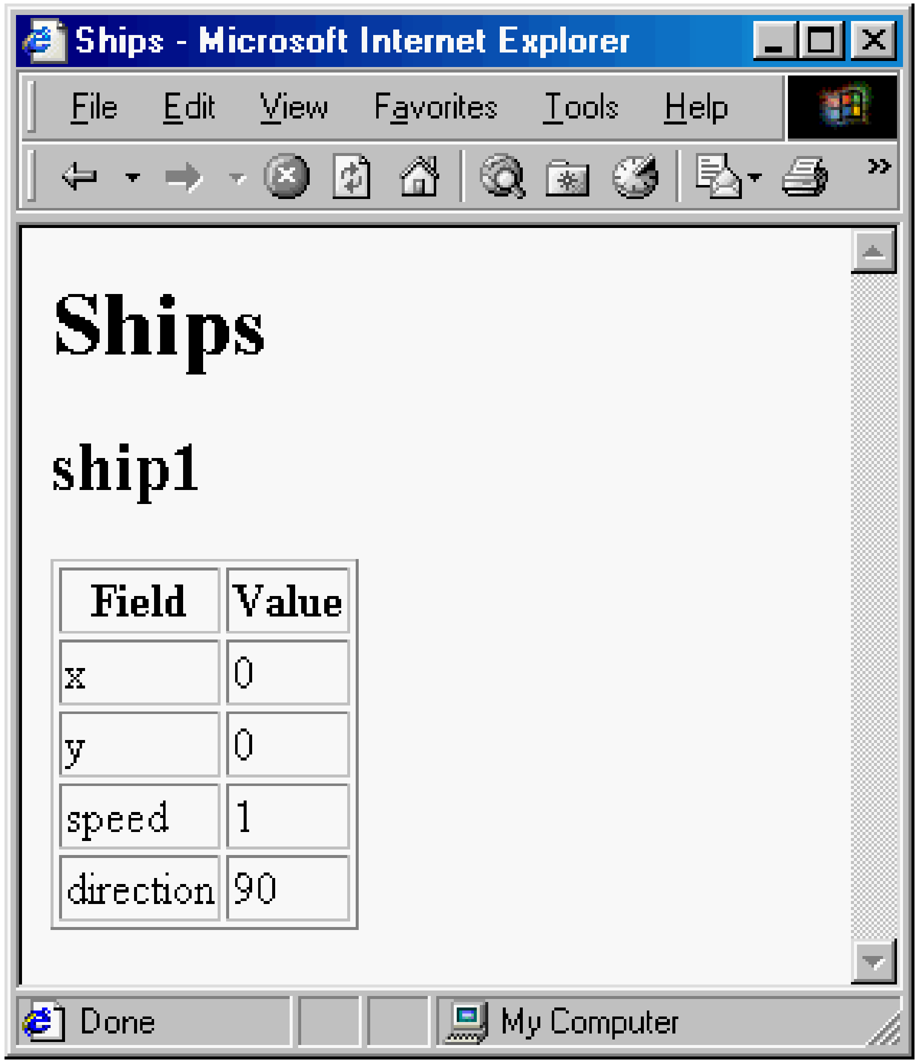
4. A "Constructor" is Just a Function that Assigns to "this"

- JavaScript does not have an exact equivalent to Java's class definition
- The closest you get is when you define a function that assigns values to properties in the `this` reference
- Calling this function using `new` binds `this` to a new `Object`
- For example, following is a simple constructor for a `Ship` class

```
function Ship(x, y, speed, direction) {
  this.x = x;
  this.y = y;
  this.speed = speed;
  this.direction = direction;
}
```

Constructor, Example

```
var ship1 =
  new Ship(0, 0, 1, 90);
makeObjectTable("ship1", ship1);
```


Ships - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Done
My Computer

Ships

ship1

Field	Value
x	0
y	0
speed	1
direction	90

JavaScript Syntax: Objects and Classes, cont.

5. Methods Are Function-Valued Properties

- No special syntax for defining methods of objects
- Instead, you simply assign a function to a property

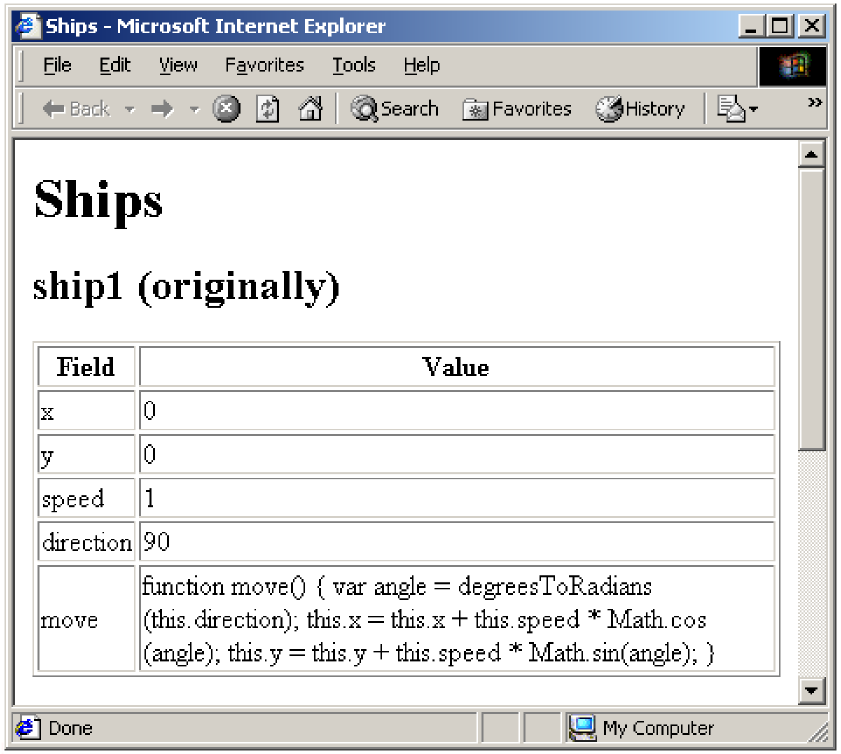
Class Methods, Example

- Consider a version of the `Ship` class that includes a `move` method

```
function degreesToRadians(degrees) {
  return(degrees * Math.PI / 180.0);
}

function move() {
  var angle = degreesToRadians(this.direction);
  this.x = this.x + this.speed * Math.cos(angle);
  this.y = this.y + this.speed * Math.sin(angle);
}

function Ship(x, y, speed, direction) {
  this.x = x;
  this.y = y;
  this.speed = speed;
  this.direction = direction;
  this.move = move;
}
```

Class Methods, Result

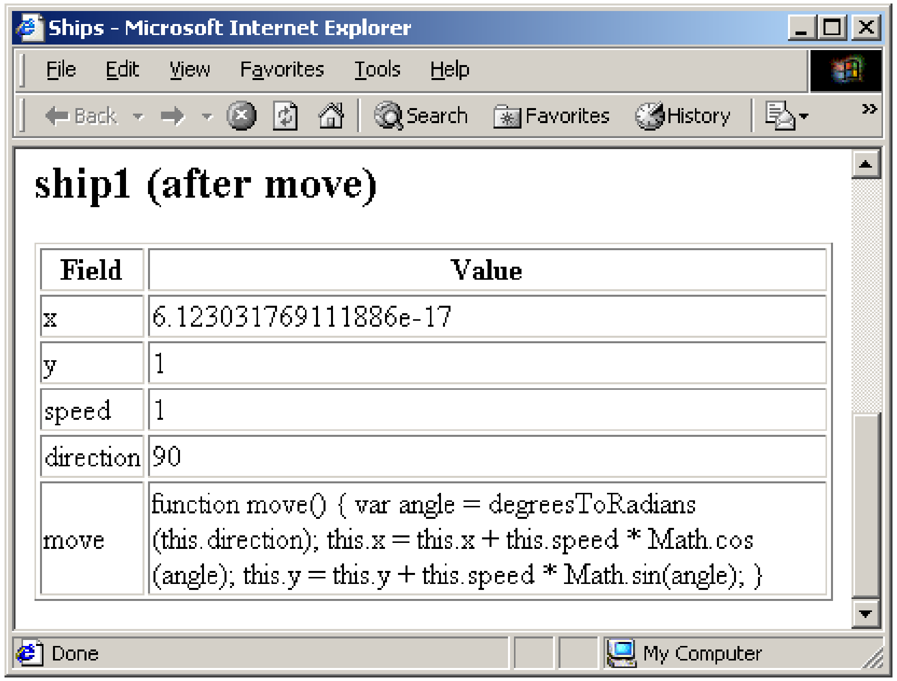
```
var ship1 = new Ship(0, 0, 1, 90);
makeObjectTable("ship1 (originally)", ship1);
ship1.move();
makeObjectTable("ship1 (after move)", ship1);
```



Ships

ship1 (originally)

Field	Value
x	0
y	0
speed	1
direction	90
move	function move() { var angle = degreesToRadians (this.direction); this.x = this.x + this.speed * Math.cos (angle); this.y = this.y + this.speed * Math.sin(angle); }



ship1 (after move)

Field	Value
x	6.123031769111886e-17
y	1
speed	1
direction	90
move	function move() { var angle = degreesToRadians (this.direction); this.x = this.x + this.speed * Math.cos (angle); this.y = this.y + this.speed * Math.sin(angle); }

JavaScript Syntax: Objects and Classes, cont.

5. **Arrays**

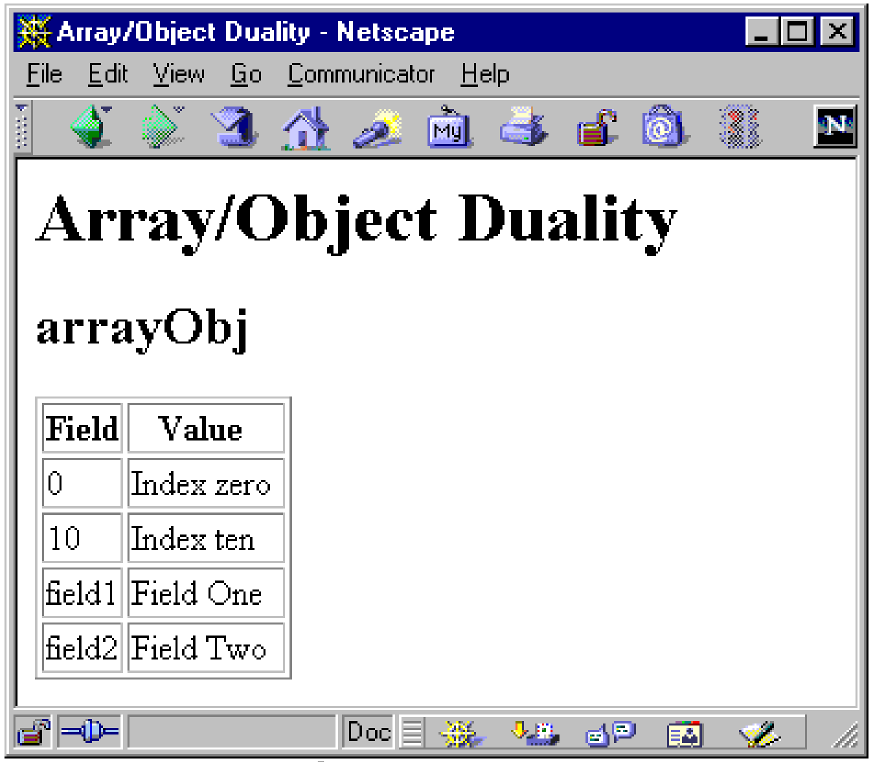
- For the most part, you can use arrays in JavaScript a lot like Java arrays.
  - Here are a few examples:

```
var squares = new Array(5);
for(var i=0; i<squares.length; i++) {
  vals[i] = i * i;
}
// Or, in one fell swoop:
var squares = new Array(0, 1, 4, 9, 16);
var array1 = new Array("fee", "fie", "fo", "fum");
// Literal Array notation for creating an array.
var array2 = [ "fee", "fie", "fo", "fum" ];
```

- Behind the scenes, however, JavaScript simply represents arrays as objects with numbered fields
  - You can access named fields using either `object.field` or `object["field"]`, but numbered fields only via `object[fieldNumber]`

Array, Example

```
var arrayObj = new Object();
arrayObj[0] = "Index zero";
arrayObj[10] = "Index ten";
arrayObj.field1 = "Field One";
arrayObj["field2"] = "Field Two";

makeObjectTable("arrayObj",
                arrayObj);
```


Array/Object Duality - Netscape
File Edit View Go Communicator Help
Doc

Array/Object Duality

arrayObj

Field	Value
0	Index zero
10	Index ten
field1	Field One
field2	Field Two

Application: Adjusting to the Browser Window Size

- **Netscape 4.0 introduced the `window.innerWidth` and `window.innerHeight` properties**
  - Lets you determine the usable size of the current browser window

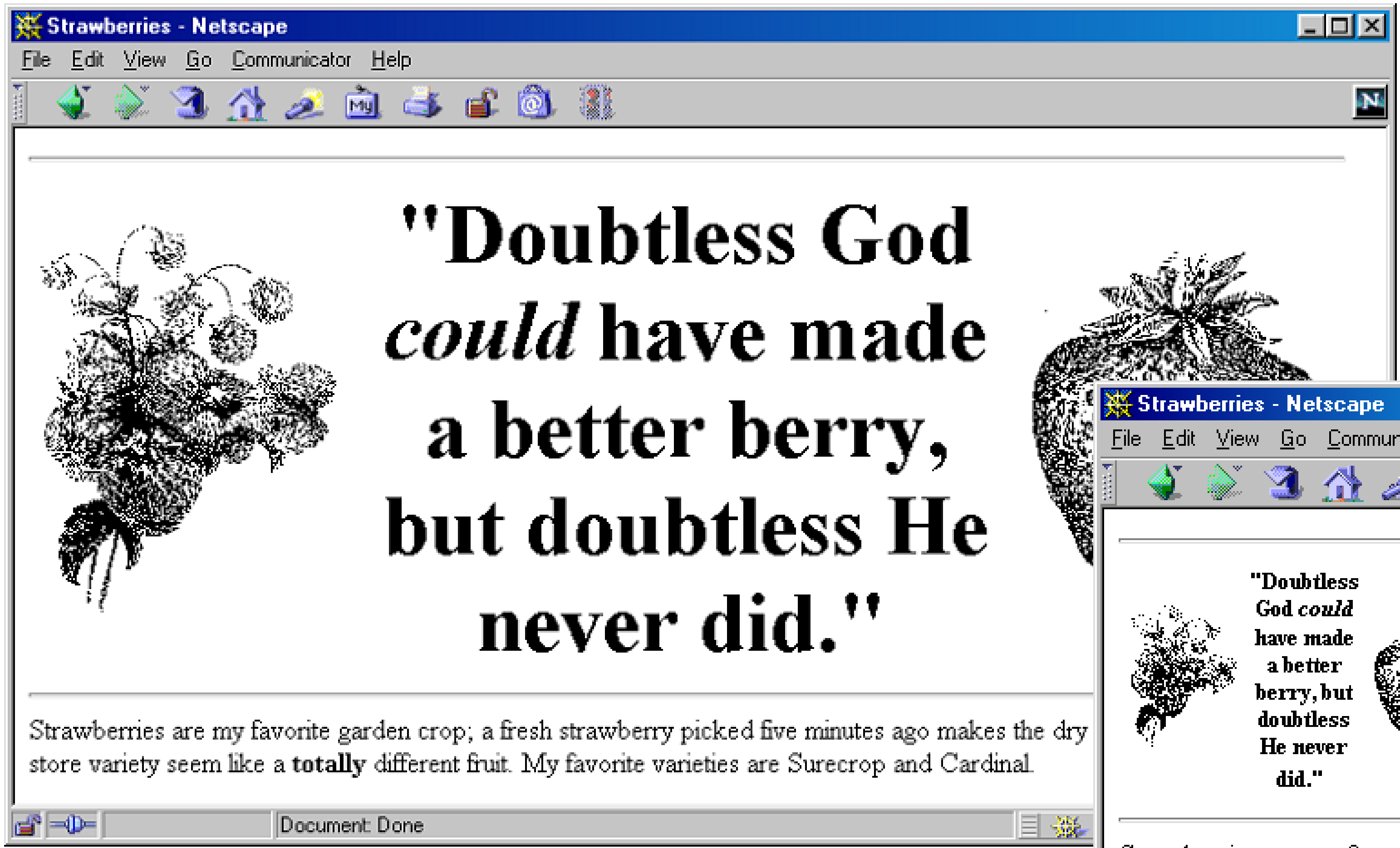
Determining Browser Size, Example

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<HEAD>
  <TITLE>Strawberries</TITLE>

<SCRIPT TYPE="text/javascript">
<!--
function image(url, width, height) {
 return('<IMG SRC="' + url + '"' +
             ' WIDTH=' + width +
             ' HEIGHT=' + height + '>');
}

function strawberry1(width) {
  return(image("Strawberry1.gif", width, Math.round(width*1.323)));
}

function strawberry2(width) {
  return(image("Strawberry2.gif", width, Math.round(width*1.155)));
}
// -->
</SCRIPT>
</HEAD>
```

Determining Browser Size, Example, cont.

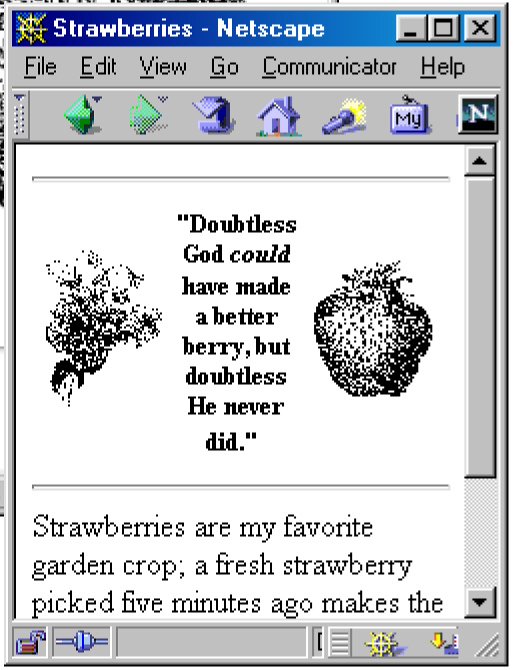
```
...
<SCRIPT TYPE="text/javascript">
<!--
  var imageWidth = window.innerWidth/4;
  var fontSize = Math.min(7, Math.round(window.innerWidth/100));

document.writeln
  ('<TABLE>\n' +
   '  <TR><TD>' + strawberry1(imageWidth) + '\n' +
   '      <TH><FONT SIZE=' + fontSize + '>\n' +
   '          "Doubtless God <I>could</I> have made\n' +
   '          a better berry, but doubtless He\n' +
   '          never did."</FONT>\n' +
   '      <TD>'  + strawberry2(imageWidth) + '\n' +
   '</TABLE>');
// -->
</SCRIPT>
<HR>

Strawberries are my favorite garden crop; a fresh ...
</BODY>
</HTML>
```

Determining Browser Size, Results



"Doubtless God *could* have made a better berry, but doubtless He never did."

Strawberries are my favorite garden crop; a fresh strawberry picked five minutes ago makes the dry store variety seem like a **totally** different fruit. My favorite varieties are Surecrop and Cardinal.



"Doubtless God *could* have made a better berry, but doubtless He never did."

Strawberries are my favorite garden crop; a fresh strawberry picked five minutes ago makes the

Application: Using JavaScript to Make Pages Dynamic

- **Modifying Images Dynamically**
  - The `document.images` property contains an array of `Image` objects corresponding to each IMG element in the current document
  - To display a new image, simply set the SRC property of an existing image to a string representing a different image file

Modifying Images, Example

- **The following function changes the first image in a document**

```
function changeImage() {
  document.images[0].src = "images/new-image.gif";
}
```

- **Referring to images by name is easier:**

```
<IMG SRC="cool-image.jpg" NAME="cool"
     WIDTH=75 HEIGHT=25>

function improveImage() {
  document.images["cool"].src = "way-cool.jpg";
}
```

Modifying Images: A Clickable Image Button, Example

```
<SCRIPT TYPE="text/javascript">
<!--
imageFiles = new Array("images/Button1-Up.gif",
                       "images/Button1-Down.gif",
                       "images/Button2-Up.gif",
                       "images/Button2-Down.gif");
imageObjects = new Array(imageFiles.length);
for(var i=0; i<imageFiles.length; i++) {
  imageObjects[i] = new Image(150, 25);
  imageObjects[i].src = imageFiles[i];
}

function setImage(name, image) {
  document.images[name].src = image;
}
```

Modifying Images: A Clickable Image Button, Example

```
function clickButton(name, grayImage) {
  var origImage = document.images[name].src;
  setImage(name, grayImage);
  var resetString =
    "setImage('" + name + "', '" + origImage + "')";
  setTimeout(resetString, 100);
}
// -->
</SCRIPT>

</HEAD>
...
<A HREF="location1.html"
   onClick="clickButton('Button1', 'images/Button1-Down.gif')">
<IMG SRC="images/Button1-Up.gif" NAME="Button1"
     WIDTH=150 HEIGHT=25></A>

<A HREF="location2.html"
   onClick="clickButton('Button2', 'images/Button2-Down.gif')">
<IMG SRC="images/Button2-Up.gif" NAME="Button2"
     WIDTH=150 HEIGHT=25></A>
...
```

Highlighting Images Under the Mouse, Example

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0
   Transitional//EN">
<HTML>
<HEAD>
  <TITLE>High Peaks Navigation Bar</TITLE>

<SCRIPT TYPE="text/javascript">
<!–

// Given "Foo", returns "images/Foo.gif".
function regularImageFile(imageName) {
  return("images/" + imageName + ".gif");
}

// Given "Bar", returns "images/Bar-Negative.gif".
function negativeImageFile(imageName) {
  return("images/" + imageName + "-Negative.gif");
}
```

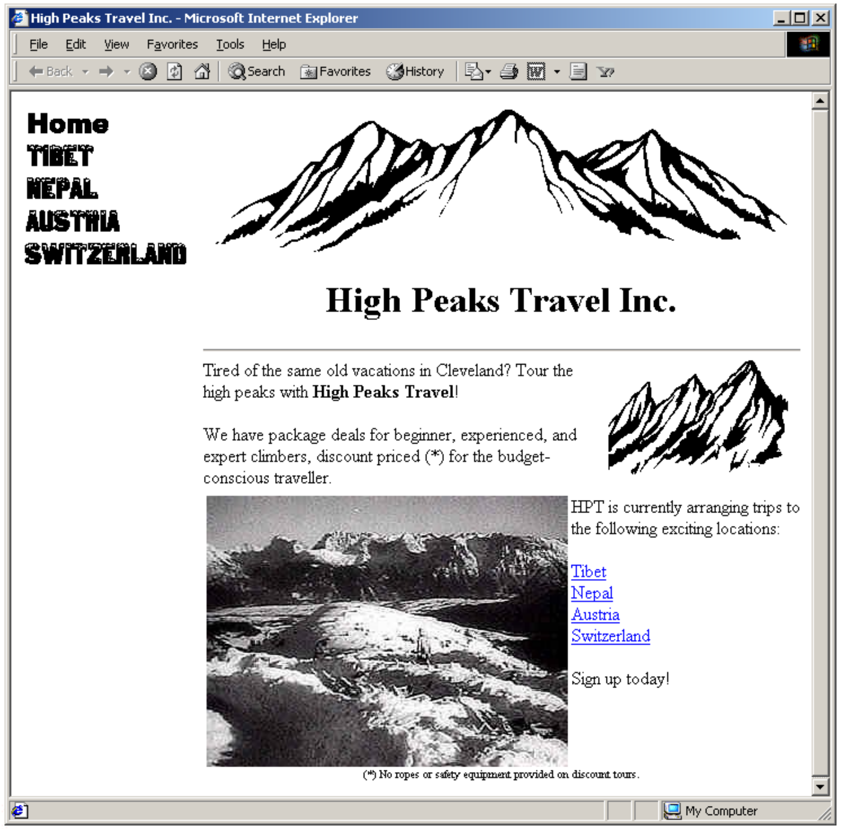
Highlighting Images Under the Mouse, Example, cont.

```
// Cache image at specified index. E.g., given index 0,
// take imageNames[0] to get "Home". Then preload
// images/Home.gif and images/Home-Negative.gif.

function cacheImages(index) {
  regularImageObjects[index] = new Image(150, 25);
  regularImageObjects[index].src =
    regularImageFile(imageNames[index]);
  negativeImageObjects[index] = new Image(150, 25);
  negativeImageObjects[index].src =
    negativeImageFile(imageNames[index]);
}

imageNames = new Array("Home", "Tibet", "Nepal",
                       "Austria", "Switzerland");
regularImageObjects = new Array(imageNames.length);
negativeImageObjects = new Array(imageNames.length);

// Put images in cache for fast highlighting.
for(var i=0; i<imageNames.length; i++) {
  cacheImages(i);
}
```

Highlighting Images Under the Mouse, Example, cont.

```
...
function highlight(imageName) {
  document.images[imageName].src = negativeImageFile(imageName);
}

function unHighlight(imageName) {
  document.images[imageName].src = regularImageFile(imageName);
}
// -->
</SCRIPT>
</HEAD>
<BODY BGCOLOR="WHITE">
<TABLE BORDER=0 WIDTH=150 BGCOLOR="WHITE"
       CELLPADDING=0 CELLSPACING=0>
 <TR><TD><A HREF="Tibet.html"
            TARGET="Main"
            onMouseOver="highlight('Tibet')"
            onMouseOut="unHighlight('Tibet')">
            <IMG SRC="images/Tibet.gif"
                 NAME="Tibet"
                 WIDTH=150 HEIGHT=25 BORDER=0>
        </A>
...
```

Highlighting Images Under the Mouse, Result


High Peaks Travel Inc. - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites History
Home
TIBET
NEPAL
AUSTRIA
SWITZERLAND
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High Peaks Travel Inc.

Tired of the same old vacations in Cleveland? Tour the high peaks with **High Peaks Travel**!

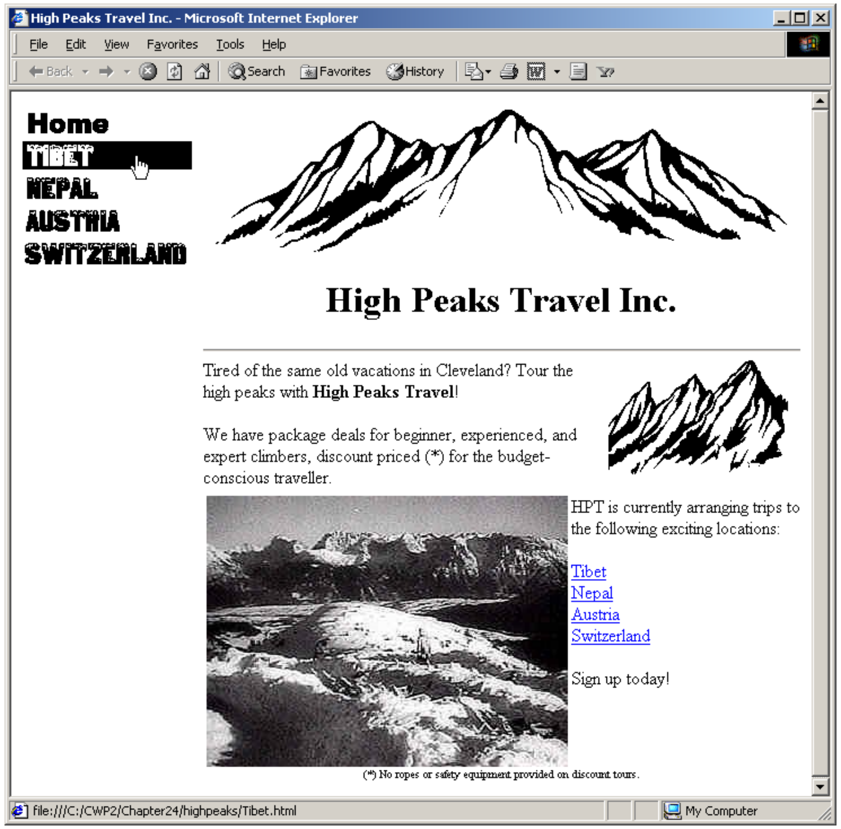
We have package deals for beginner, experienced, and expert climbers, discount priced (*) for the budget-conscious traveller.

HPT is currently arranging trips to the following exciting locations:

Tibet
Nepal
Austria
Switzerland

Sign up today!

(*) No ropes or safety equipment provided on discount tours.


High Peaks Travel Inc. - Microsoft Internet Explorer
File Edit View Favorites Tools Help
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Switzerland

Sign up today!

(*) No ropes or safety equipment provided on discount tours.

file:///C:/CWP2/Chapter24/highpeaks/Tibet.html

Making Pages Dynamic: Moving Layers

- Netscape 4 introduced “layers” – regions that can overlap and be positioned arbitrarily
- JavaScript 1.2 lets you access layers via the `document.layers` array, each element of which is a `Layer` object with properties corresponding to the attributes of the `LAYER` element
- A named layer can be accessed via `document.layers["layer name"]` rather than by using an index, or simply by using `document.layerName`

Moving Layers, Example

- **Descriptive overlays slowly "drift" to final spot when button clicked**

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<HEAD>
  <TITLE>Camps on K-3</TITLE>

<SCRIPT TYPE="text/javascript">
<!--
function hideCamps() {
  // Netscape 4 document model.
  document.layers["baseCamp"].visibility = "hidden";
  document.layers["highCamp"].visibility = "hidden";
  // Or document.baseCamp.visibility = "hidden";
}

function moveBaseCamp() {
  baseCamp.moveBy(1, 3);
  if (baseCamp.pageX < 130) {
    setTimeout("moveBaseCamp()", 10);
  }
}
```

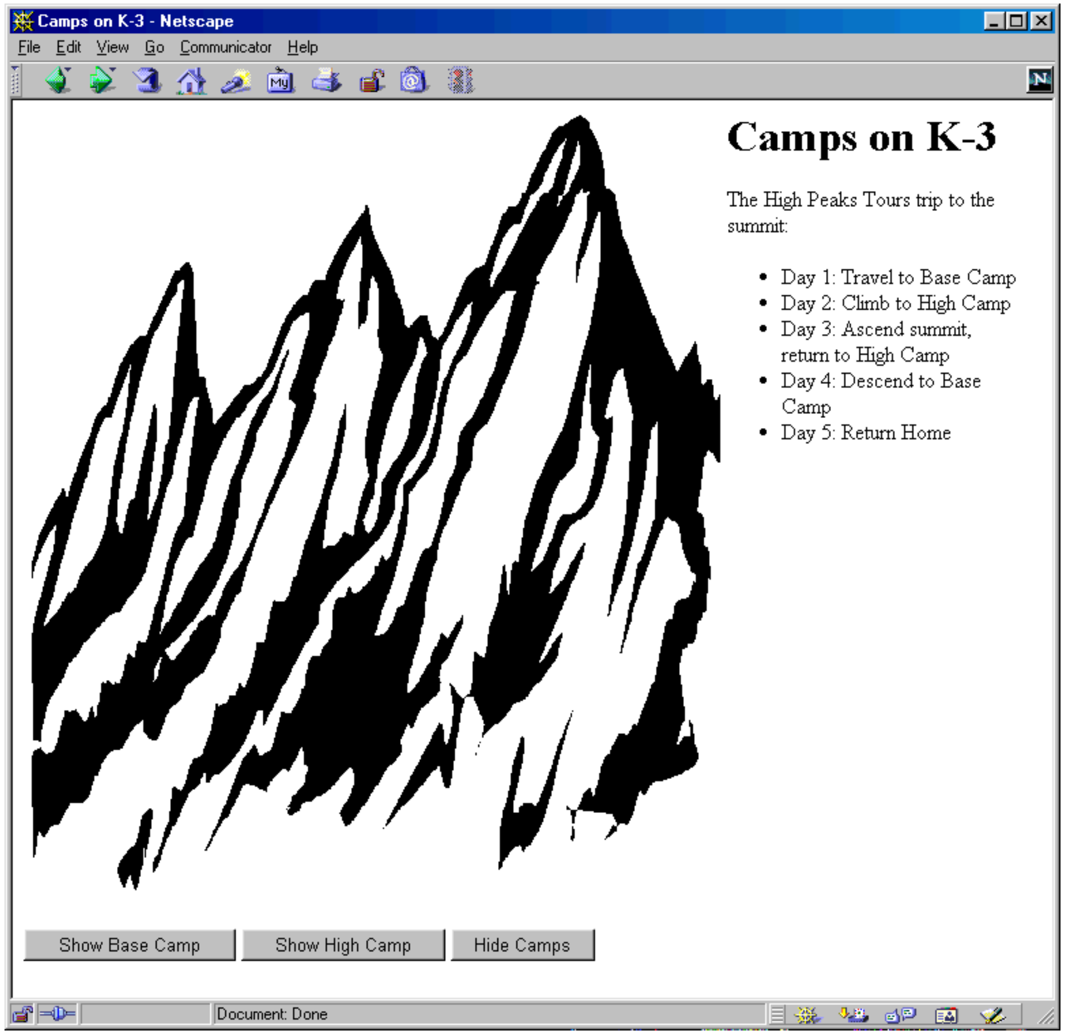
Moving Layers, Example, cont.

```
function showBaseCamp() {
  hideCamps();
  baseCamp =  document.layers["baseCamp"];
  baseCamp.moveToAbsolute(0, 20);
  baseCamp.visibility = "show";
  moveBaseCamp();
}
function moveHighCamp() {
  highCamp.moveBy(2, 1);
  if (highCamp.pageX < 110) {
    setTimeout("moveHighCamp()", 10);
  }
}

function showHighCamp() {
  hideCamps();
  highCamp =  document.layers["highCamp"];
  highCamp.moveToAbsolute(0, 65);
  highCamp.visibility = "show";
  moveHighCamp();
}
// -->
</SCRIPT>
```

Moving Layers, Example, cont.

```
<LAYER ID="highCamp" PAGEX=50 PAGEY=100 VISIBILITY="hidden">
  <TABLE>
    <TR><TH BGCOLOR="WHITE" WIDTH=50>
        <FONT SIZE="+2">High Camp</FONT>
        <TD><IMG SRC="images/Arrow-Right.gif">
  </TABLE>
</LAYER>
<LAYER ID="baseCamp" PAGEX=50 PAGEY=100 VISIBILITY="hidden">
  <TABLE>
    <TR><TH BGCOLOR="WHITE" WIDTH=50>
        <FONT SIZE="+2">Base Camp</FONT>
        <TD><IMG SRC="images/Arrow-Right.gif">
  </TABLE>
</LAYER>

<FORM>
  <INPUT TYPE="Button" VALUE="Show Base Camp"
         onClick="showBaseCamp()">
  <INPUT TYPE="Button" VALUE="Show High Camp"
         onClick="showHighCamp()">
  <INPUT TYPE="Button" VALUE="Hide Camps"
         onClick="hideCamps()">
</FORM>
```

Moving Layers, Result

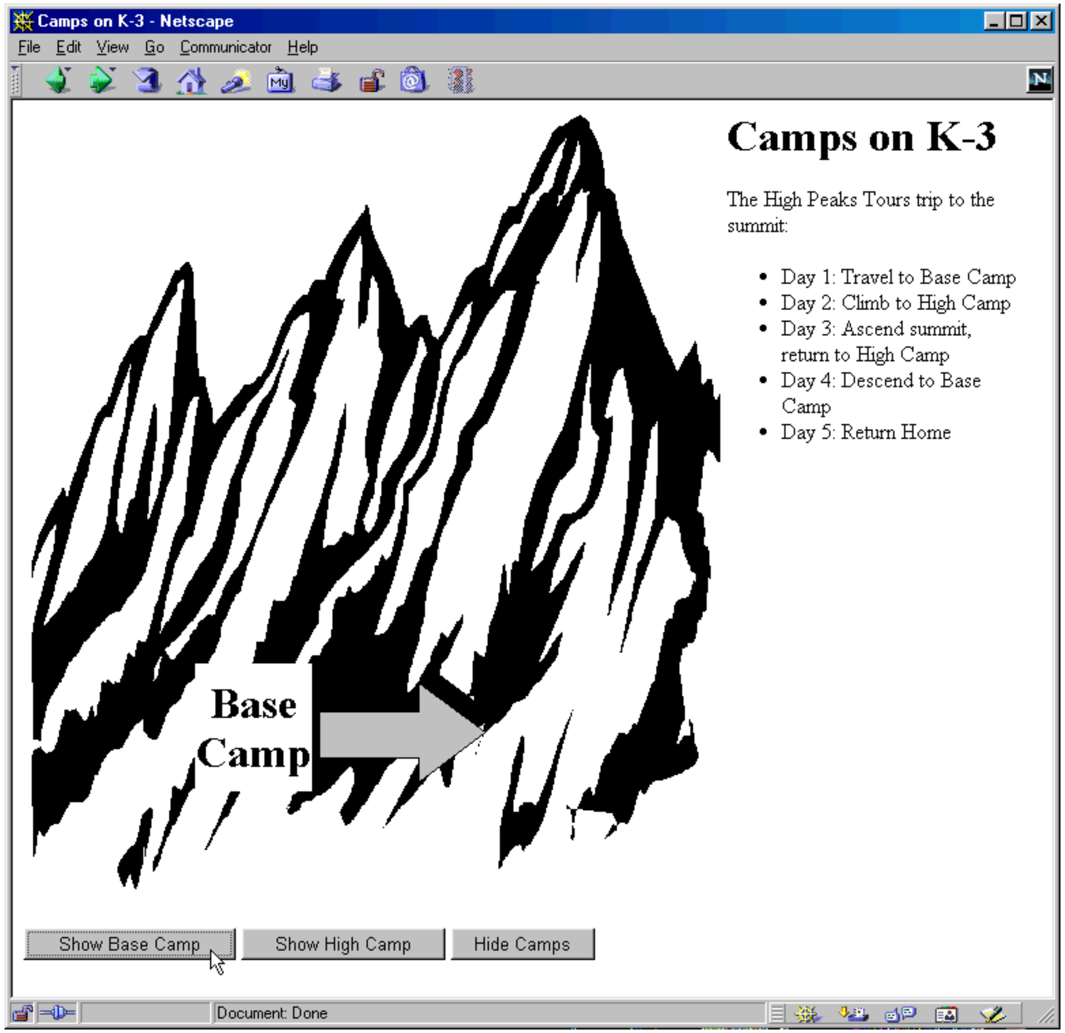


Camps on K-3

The High Peaks Tours trip to the summit:

- Day 1: Travel to Base Camp
- Day 2: Climb to High Camp
- Day 3: Ascend summit, return to High Camp
- Day 4: Descend to Base Camp
- Day 5: Return Home

Moving Layers, Result



Camps on K-3

The High Peaks Tours trip to the summit:

- Day 1: Travel to Base Camp
- Day 2: Climb to High Camp
- Day 3: Ascend summit, return to High Camp
- Day 4: Descend to Base Camp
- Day 5: Return Home

Application: Using JavaScript to Validate CGI Forms

1. Accessing Forms

- The `document.forms` property contains an array of `Form` entries contained in the document
- As usual in JavaScript, named entries can be accessed via name instead of by number, plus named forms are automatically inserted as properties in the document object, so any of the following formats would be legal to access forms

```
var firstForm = document.forms[0];
// Assumes <FORM NAME="orders" ...>
var orderForm = document.forms["orders"];
// Assumes <FORM NAME="register" ...>
var registrationForm = document.register;
```

Application: Using JavaScript to Validate CGI Forms, cont.

2. **Accessing Elements within Forms**
   - The `Form` object contains an elements property that holds an array of `Element` objects
   - You can retrieve form elements by number, by name from the array, or via the property name:

```
var firstElement = firstForm.elements[0];
// Assumes <INPUT ... NAME="quantity">
var quantityField = orderForm.elements["quantity"];
// Assumes <INPUT ... NAME="submitSchedule">
var submitButton = register.submitSchedule;
```

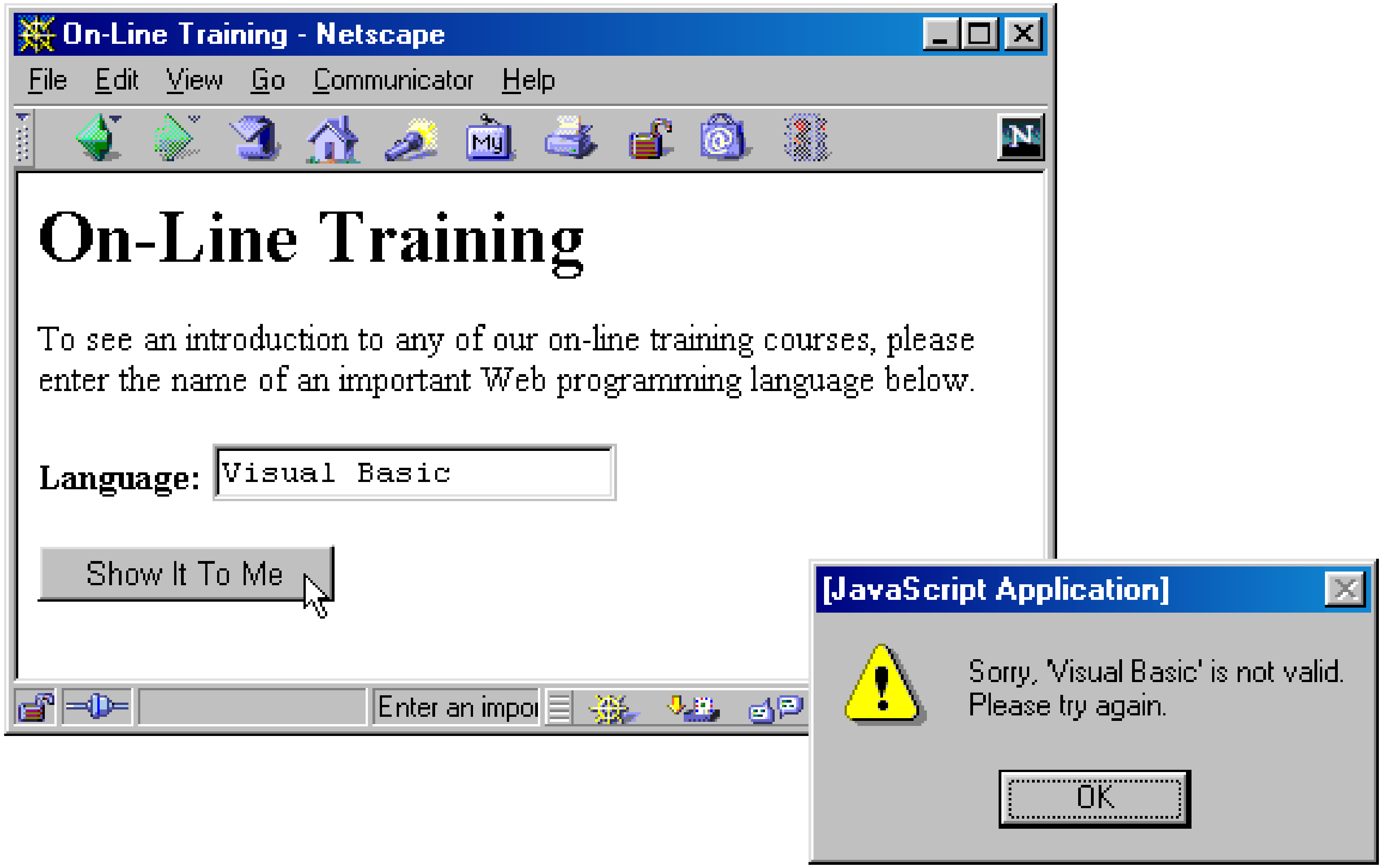
Checking Form Values Individually, Example

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<HEAD>
  <TITLE>On-Line Training</TITLE>
<SCRIPT TYPE="text/javascript">
<!--
...
// When the user changes and leaves textfield, check
// that a valid choice was entered. If not, alert
// user, clear field, and set focus back there.

function checkLanguage() {
  // or document.forms["langForm"].elements["langField"]
  var field = document.langForm.langField;
  var lang = field.value;
  var prefix = lang.substring(0, 4).toUpperCase();
  if (prefix != "JAVA") {
    alert("Sorry, '" + lang + "' is not valid.\n" +
          "Please try again.");
    field.value = "";  // Erase old value
    field.focus();     // Give keyboard focus
  }
}
```

Checking Form Values Individually, Example, cont.

```
// -->
</SCRIPT>
</HEAD>
<BODY BGCOLOR="WHITE">
<H1>On-Line Training</H1>

<FORM ACTION="cgi-bin/registerLanguage" NAME="langForm">
To see an introduction to any of our on-line training
courses, please enter the name of an important Web
programming language below.
<P>
<B>Language:</B>
<INPUT TYPE="TEXT" NAME="langField"
       onFocus="describeLanguage()"
       onBlur="clearStatus()"
       onChange="checkLanguage()">
<P>
<INPUT TYPE="SUBMIT" VALUE="Show It To Me">
</FORM>

</BODY>
</HTML>
```

Checking Form Values Individually, Results


On-Line Training - Netscape
File Edit View Go Communicator Help
Show It To Me
Enter an impo
[JavaScript Application]
OK

On-Line Training

To see an introduction to any of our on-line training courses, please enter the name of an important Web programming language below.

Language: Visual Basic

Sorry, 'Visual Basic' is not valid.
Please try again.

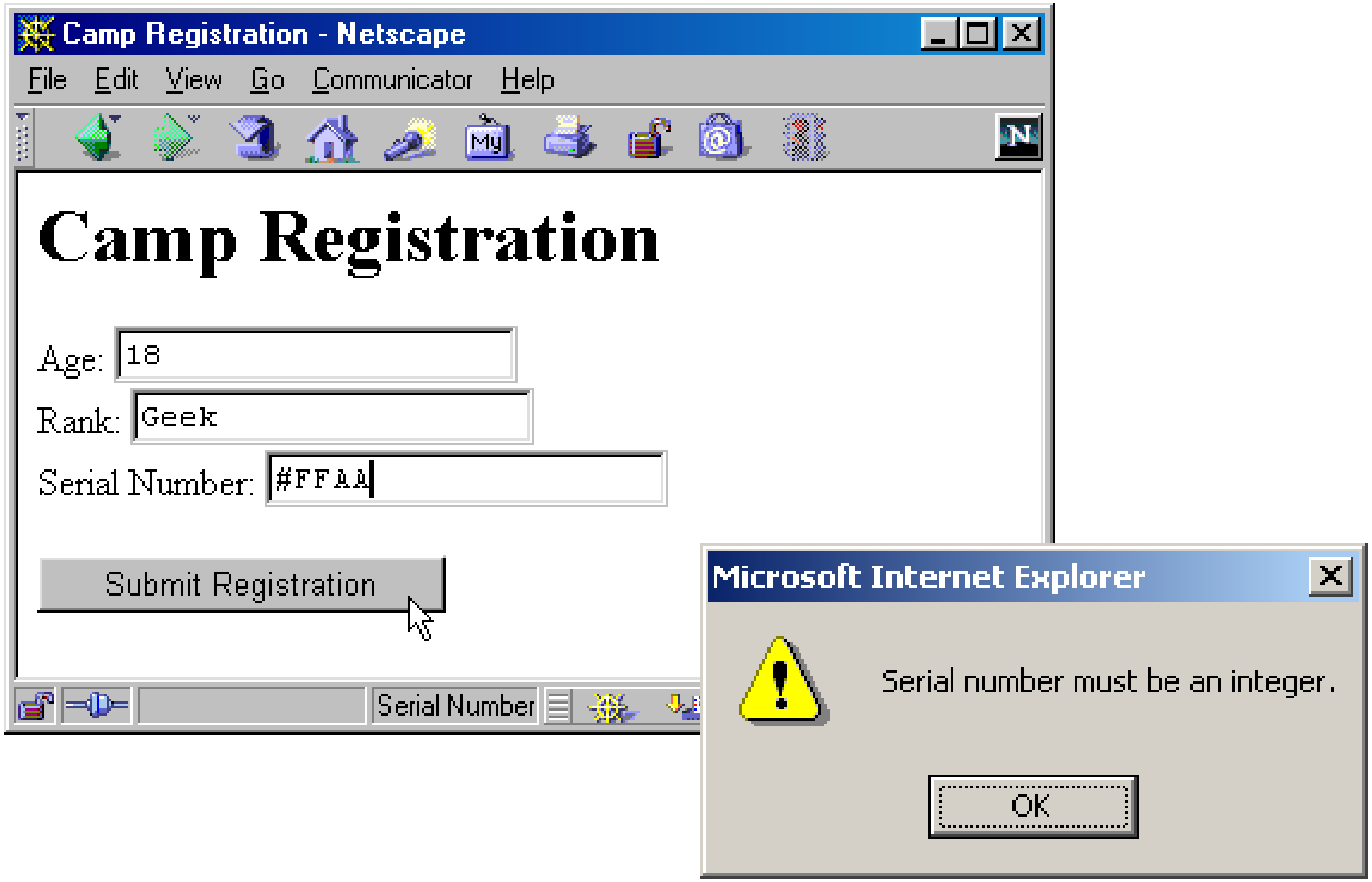
Checking Values When Form is Submitted, Example

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<HEAD>
  <TITLE>Camp Registration</TITLE>
<SCRIPT TYPE="text/javascript">
<!--
function isInt(string) {
  var val = parseInt(string);
  return(val > 0);
}

function checkRegistration() {
  var ageField = document.registerForm.ageField;
  if (!isInt(ageField.value)) {
    alert("Age must be an integer.");
    return(false);
  }
  ...
  // Format looks OK. Submit form.
  return(true);
}
// -->
</SCRIPT>
```

Checking Values When Form is Submitted, Example, cont.

```
<BODY BGCOLOR="WHITE">
<H1>Camp Registration</H1>

<FORM ACTION="cgi-bin/register"
      NAME="registerForm"
      onSubmit="return(checkRegistration())">
Age: <INPUT TYPE="TEXT" NAME="ageField"
            onFocus="promptAge()"
            onBlur="clearStatus()">
<BR>
Rank: <INPUT TYPE="TEXT" NAME="rankField"
             onFocus="promptRank()"
             onBlur="clearStatus()">
<BR>
Serial Number: <INPUT TYPE="TEXT" NAME="serialField"
                      onFocus="promptSerial()"
                      onBlur="clearStatus()">
<P>
<INPUT TYPE="SUBMIT" VALUE="Submit Registration">
</FORM>

</BODY>
</HTML>
```

Checking Values When Form is Submitted, Results


Camp Registration - Netscape

File Edit View Go Communicator Help

Camp Registration

Age: 18

Rank: Geek

Serial Number: #FFAA

Submit Registration

Serial Number

Microsoft Internet Explorer

Serial number must be an integer.

OK

Application: Using JavaScript to Store and Examine Cookies

1. **Using document.cookies**

   – Set it (one cookie at a time) to store values

```
  document.cookie = "name1=val1";
  document.cookie = "name2=val2; expires=" + someDate;
  document.cookie = "name3=val3; path=/;
domain=test.com";
```

   – Read it (all cookies in a single string) to access values

Application: Using JavaScript to Store and Examine Cookies

2. Parsing Cookies

```
function cookieVal(cookieName, cookieString) {
  var startLoc = cookieString.indexOf(cookieName);
  if (startLoc == -1) {
    return("");  // No such cookie
  }
  var sepLoc = cookieString.indexOf("=", startLoc);
  var endLoc = cookieString.indexOf(";", startLoc);
  if (endLoc == -1) { // Last one has no ";"
    endLoc = cookieString.length;
  }
  return(cookieString.substring(sepLoc+1, endLoc));
}
```

Exercise

- Using JavaScript, write a page to solve equation in which it can get input from user, validate input and display result.

Cookie, Example

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<HEAD>
  <TITLE>Widgets "R" Us</TITLE>
<SCRIPT TYPE="text/javascript">
<!--

function storeCookies() {
  var expires = "; expires=Monday, 01-Dec-01 23:59:59 GMT";
  var first = document.widgetForm.firstField.value;
  var last = document.widgetForm.lastField.value;
  var account = document.widgetForm.accountField.value;
  document.cookie = "first=" + first + expires;
  document.cookie = "last=" + last + expires;
  document.cookie = "account=" + account + expires;
}

// Store cookies and give user confirmation.
function registerAccount() {
  storeCookies();
  alert("Registration Successful.");
}
```

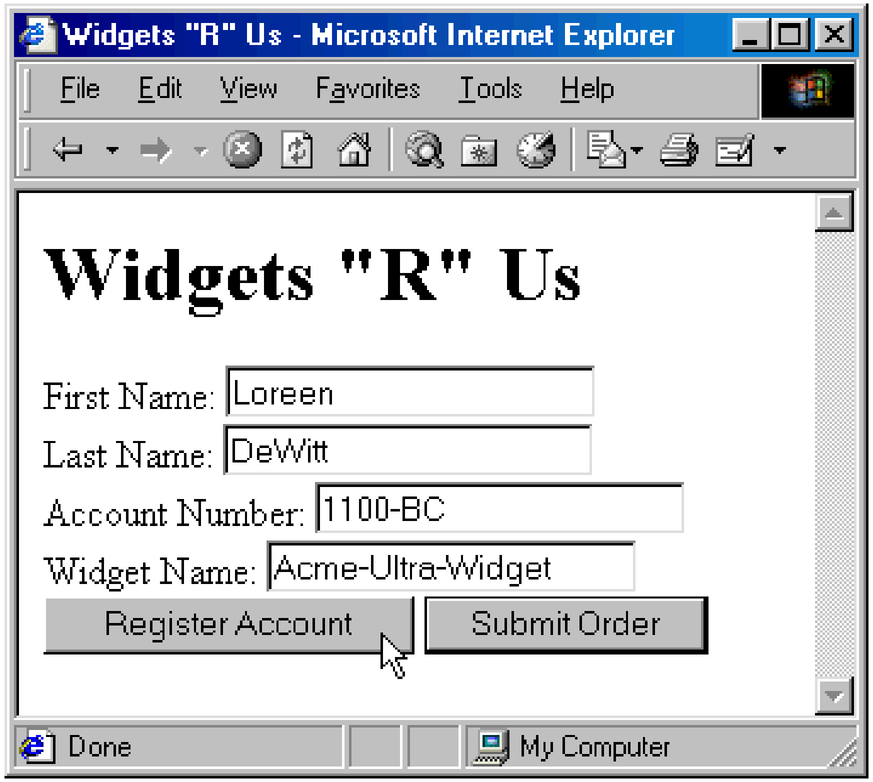
Cookie, Example, cont.

```
function cookieVal(cookieName, cookieString) {
  var startLoc = cookieString.indexOf(cookieName);
  if (startLoc == -1) {
    return("");  // No such cookie
  }
  var sepLoc = cookieString.indexOf("=", startLoc);
  var endLoc = cookieString.indexOf(";", startLoc);
  if (endLoc == -1) { // Last one has no ";"
    endLoc = cookieString.length;
  }
  return(cookieString.substring(sepLoc+1, endLoc));
}

function presetValues() {
  var firstField = document.widgetForm.firstField;
  var lastField = document.widgetForm.lastField;
  var accountField = document.widgetForm.accountField;
  var cookies = document.cookie;
  firstField.value = cookieVal("first", cookies);
  lastField.value = cookieVal("last", cookies);
  accountField.value = cookieVal("account", cookies);
}
// -->
</SCRIPT>
```

Cookie, Example, cont.

```
</HEAD>
<BODY BGCOLOR="WHITE" onLoad="presetValues()">

<H1>Widgets "R" Us</H1>

<FORM ACTION="servlet/cwp.Widgets"
      NAME="widgetForm"
      onSubmit="storeCookies()">
First Name: <INPUT TYPE="TEXT" NAME="firstField">
<BR>
Last Name: <INPUT TYPE="TEXT" NAME="lastField">
<BR>
Account Number: <INPUT TYPE="TEXT" NAME="accountField">
<BR>
Widget Name: <INPUT TYPE="TEXT" NAME="widgetField">
<BR>
<INPUT TYPE="BUTTON" VALUE="Register Account"
       onClick="registerAccount()">
<INPUT TYPE="SUBMIT" VALUE="Submit Order">

</FORM>
</BODY>
</HTML>
```

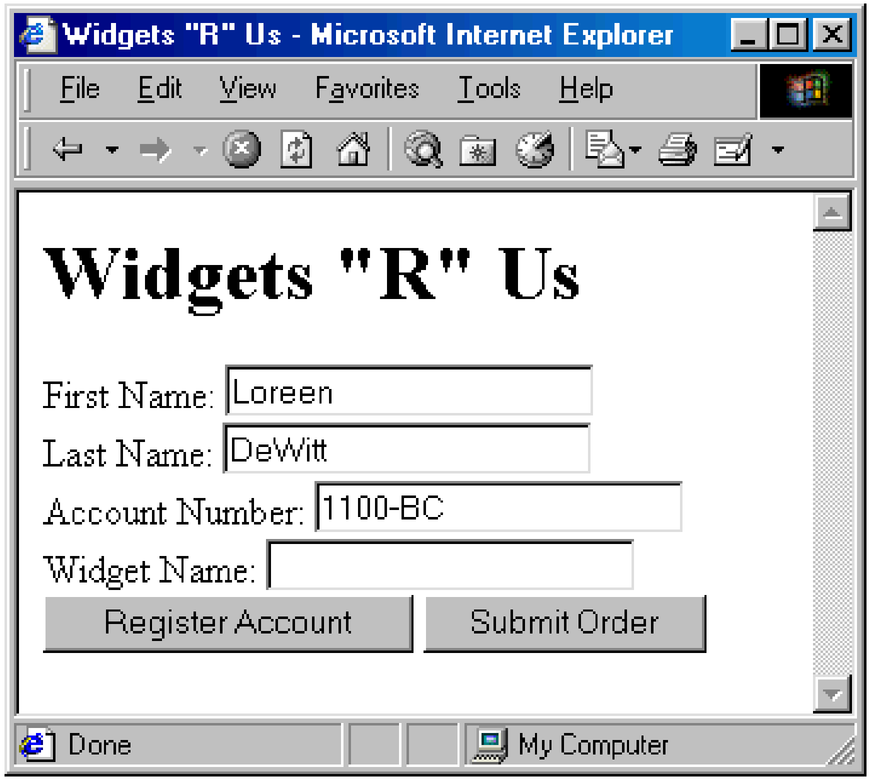
Cookie, Example, Result


Widgets "R" Us - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Done
My Computer

Widgets "R" Us

First Name:	Loreen
Last Name:	DeWitt
Account Number:	1100-BC
Widget Name:	Acme-Ultra-Widget

Register Account | Submit Order


Widgets "R" Us - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Done
My Computer

Widgets "R" Us

First Name:	Loreen
Last Name:	DeWitt
Account Number:	1100-BC
Widget Name:	

Register Account | Submit Order

Application: Using JavaScript to Interact with Frames

- **Idea**
  - The default `Window` object contains a `frames` property holding an array of frames (other `Window` objects) contained by the current window or frame.
    - It also has `parent` and `top` properties referring to the directly enclosing frame or window and the top-level window, respectively.
    - All of the properties of `Window` can be applied to any of these entries.

Displaying a URL in a Particular Frame, Example

- **ShowURL.html**

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Frameset//EN">
<HTML>
<HEAD>
  <TITLE>Show a URL</TITLE>
</HEAD>

<FRAMESET ROWS="150, *">
  <FRAME SRC="GetURL.html" NAME="inputFrame">
  <FRAME SRC="DisplayURL.html" NAME="displayFrame">
</FRAMESET>

</HTML>
```

Displaying a URL in a Particular Frame, Example, cont.

- **GetURL.html**

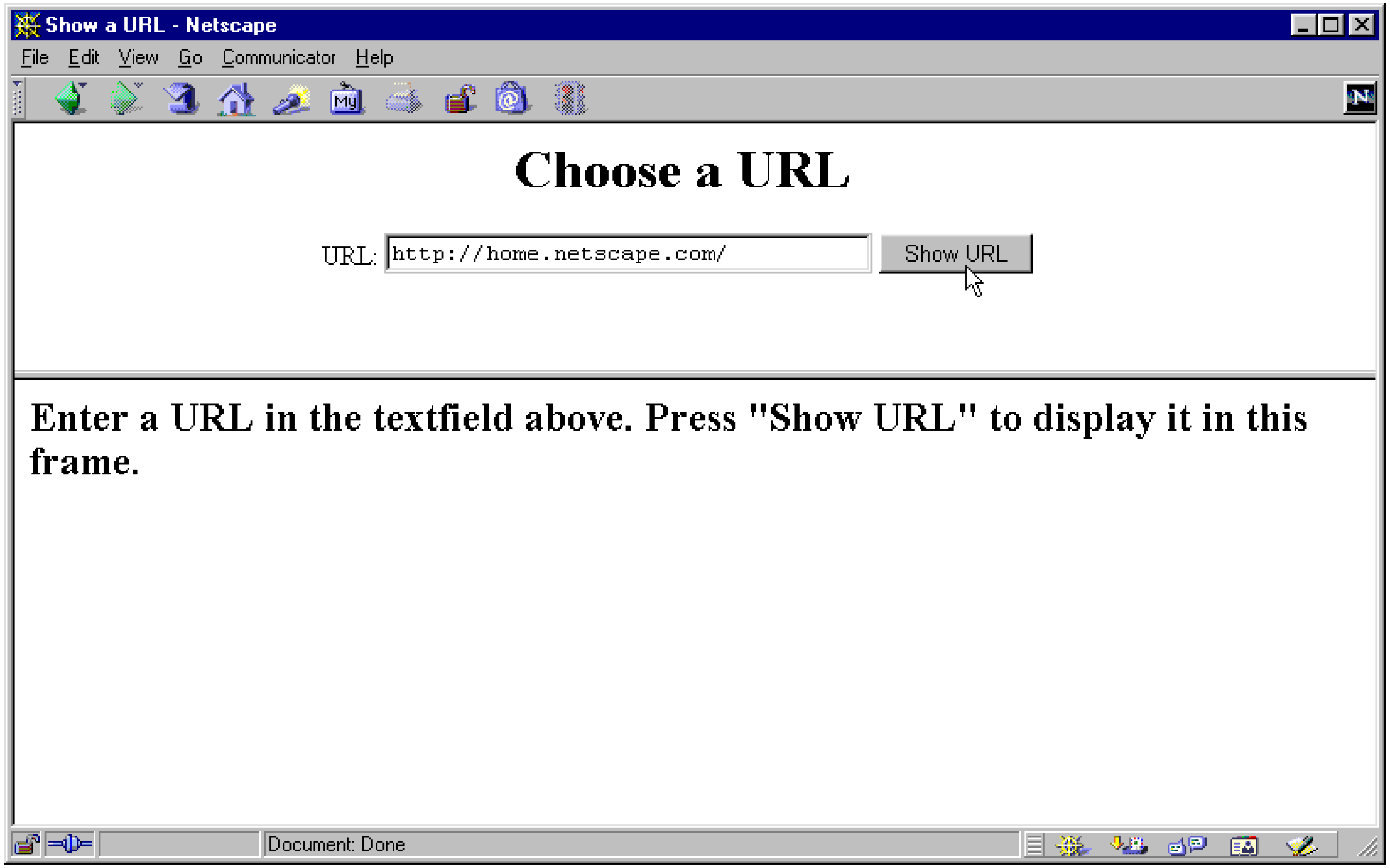
```
<HTML>
<HEAD>
  <TITLE>Choose a URL</TITLE>
<SCRIPT TYPE="text/javascript">
<!--
function showURL() {
  var url = document.urlForm.urlField.value;
  // or parent.frames["displayFrame"].location = url;
  parent.displayFrame.location = url;
}

function preloadUrl() {
  if (navigator.appName == "Netscape") {
    document.urlForm.urlField.value =
      "http://home.netscape.com/";
  } else {
    document.urlForm.urlField.value =
      "http://www.microsoft.com/";
  }
}
...
```

Displaying a URL in a Particular Frame, Example, cont.

- GetURL.html, cont.

```
<BODY BGCOLOR="WHITE" onLoad="preloadUrl()">
<H1 ALIGN="CENTER">Choose a URL</H1>

<CENTER>
<FORM NAME="urlForm">
URL: <INPUT TYPE="TEXT" NAME="urlField" SIZE=35>
<INPUT TYPE="BUTTON" VALUE="Show URL"
       onClick="showURL()">
</FORM>
</CENTER>

</BODY>
</HTML>
```

Displaying a URL in a Particular Frame, Result



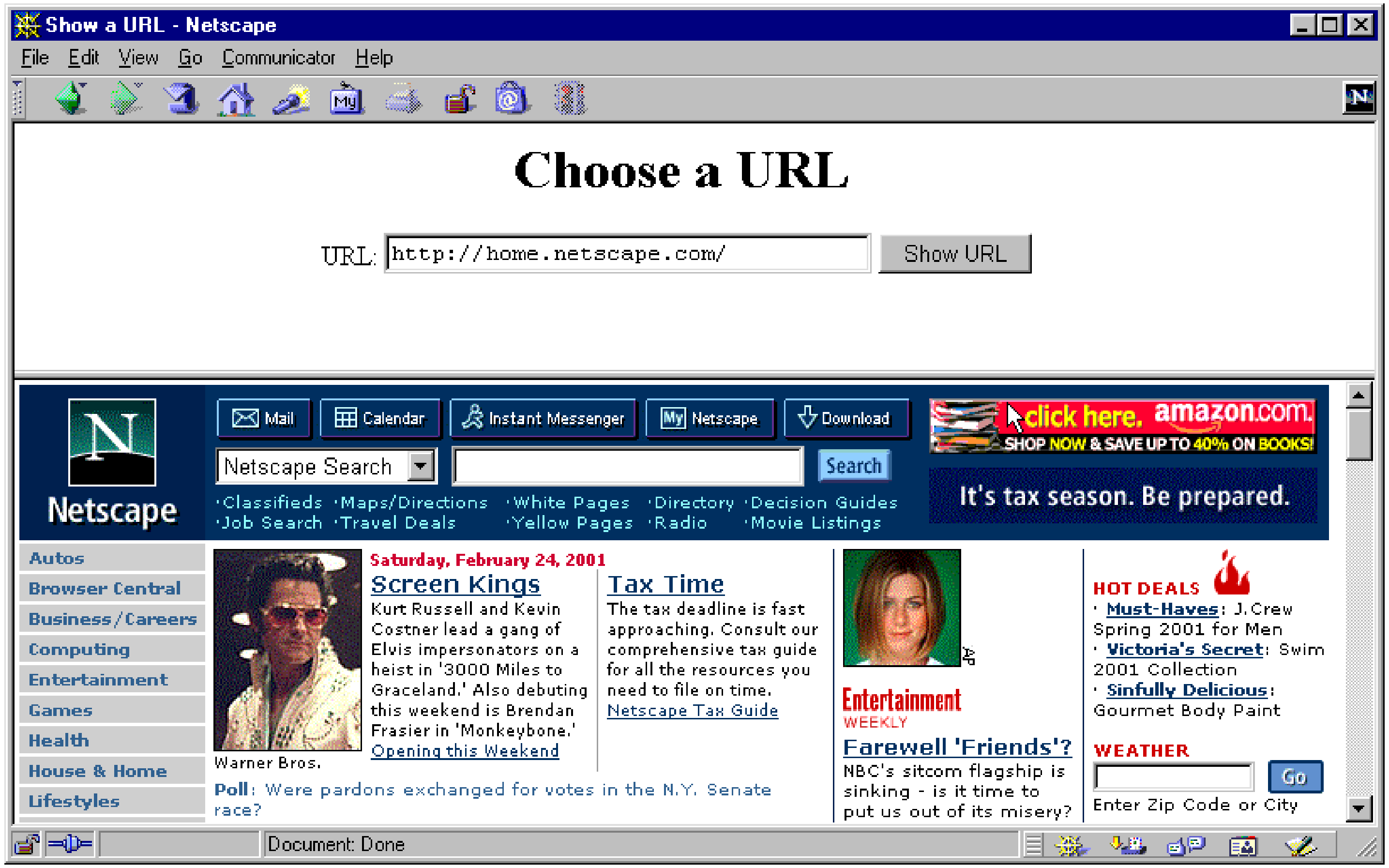
Choose a URL

URL: http://home.netscape.com/ [Show URL]

Enter a URL in the textfield above. Press "Show URL" to display it in this frame.

Document: Done

Displaying a URL in a Particular Frame, Result, cont.


Show a URL - Netscape

File Edit View Go Communicator Help

Choose a URL

URL: http://home.netscape.com/ Show URL

Netscape

Mail Calendar Instant Messenger My Netscape Download

Netscape Search Search

·Classifieds ·Maps/Directions ·White Pages ·Directory ·Decision Guides
·Job Search ·Travel Deals ·Yellow Pages ·Radio ·Movie Listings

click here. amazon.com. SHOP NOW & SAVE UP TO 40% ON BOOKS!

It's tax season. Be prepared.

Autos
Browser Central
Business/Careers
Computing
Entertainment
Games
Health
House & Home
Lifestyles

Saturday, February 24, 2001

Screen Kings
Kurt Russell and Kevin Costner lead a gang of Elvis impersonators on a heist in '3000 Miles to Graceland.' Also debuting this weekend is Brendan Frasier in 'Monkeybone.'
Opening this Weekend

Warner Bros.

Tax Time
The tax deadline is fast approaching. Consult our comprehensive tax guide for all the resources you need to file on time.
Netscape Tax Guide

Poll: Were pardons exchanged for votes in the N.Y. Senate race?

Entertainment WEEKLY
Farewell 'Friends'?
NBC's sitcom flagship is sinking - is it time to put us out of its misery?

HOT DEALS
· Must-Haves: J.Crew Spring 2001 for Men
· Victoria's Secret: Swim 2001 Collection
· Sinfully Delicious: Gourmet Body Paint

WEATHER
Go
Enter Zip Code or City

Document: Done

Giving a Frame the Input Focus, Example

- **If JavaScript is manipulating the frames, the fix is easy: just add a call to focus in showUrl:**

```
function showURL() {
  var url = document.urlForm.urlField.value;
  parent.displayFrame.location = url;
  // Give frame the input focus
  parent.displayFrame.focus();
}
```

- **Fixing the problem in regular HTML documents is a bit more tedious**
  - Requires adding `onClick` handlers that call focus to each and every occurrence of `A` and `AREA` that includes a `TARGET`, and a similar `onSubmit` handler to each `FORM` that uses `TARGET`

Application: Accessing Java from JavaScript

1. **Idea**
   - Netscape 3.0 introduced a package called LiveConnect that allows JavaScript to talk to Java and vice versa
   - Applications:
     - Calling Java methods directly.
       - In particular, this section shows how to print debugging messages to the Java console
     - Using applets to perform operations for JavaScript
       - In particular, this section shows how a hidden applet can be used to obtain the client hostname, information not otherwise available to JavaScript
     - Controlling applets from JavaScript
       - In particular, this section shows how LiveConnect allows user actions in the HTML part of the page to trigger actions in the applet

Application: Accessing Java from JavaScript

- **Calling Java Methods Directly**
  - JavaScript can access Java variables and methods simply by using the fully qualified name. For instance:

```
java.lang.System.out.println("Hello Console");
```

  - Limitations:
    - Can’t perform operations forbidden to applets
    - No try/catch, so can’t call methods that throw exceptions
    - Cannot write methods or create subclasses

Controlling Applets from JavaScript, Example

- **MoldSimulation.html, cont.**

```
<BODY BGCOLOR="#C0C0C0">
<H1>Mold Propagation Simulation</H1>

<APPLET CODE="RandomCircles.class" WIDTH=100 HEIGHT=75>
</APPLET>
<P>
<APPLET CODE="RandomCircles.class" WIDTH=300 HEIGHT=75>
</APPLET>
<P>
<APPLET CODE="RandomCircles.class" WIDTH=500 HEIGHT=75>
</APPLET>

<FORM>
<INPUT TYPE="BUTTON" VALUE="Start Simulations"
       onClick="startCircles()">
<INPUT TYPE="BUTTON" VALUE="Stop Simulations"
       onClick="stopCircles()">
</FORM>

</BODY>
</HTML>
```

Controlling Applets from JavaScript, Example

- **MoldSimulation.html**

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<HEAD>
  <TITLE>Mold Propagation Simulation</TITLE>
<SCRIPT TYPE="text/javascript">
<!--
function startCircles() {
  for(var i=0; i<document.applets.length; i++) {
    document.applets[i].startCircles();
  }
}

function stopCircles() {
  for(var i=0; i<document.applets.length; i++) {
    document.applets[i].stopCircles();
  }
}
// -->
</SCRIPT>
</HEAD>
```

Controlling Applets from JavaScript, Example

- **RandomCircles.java**

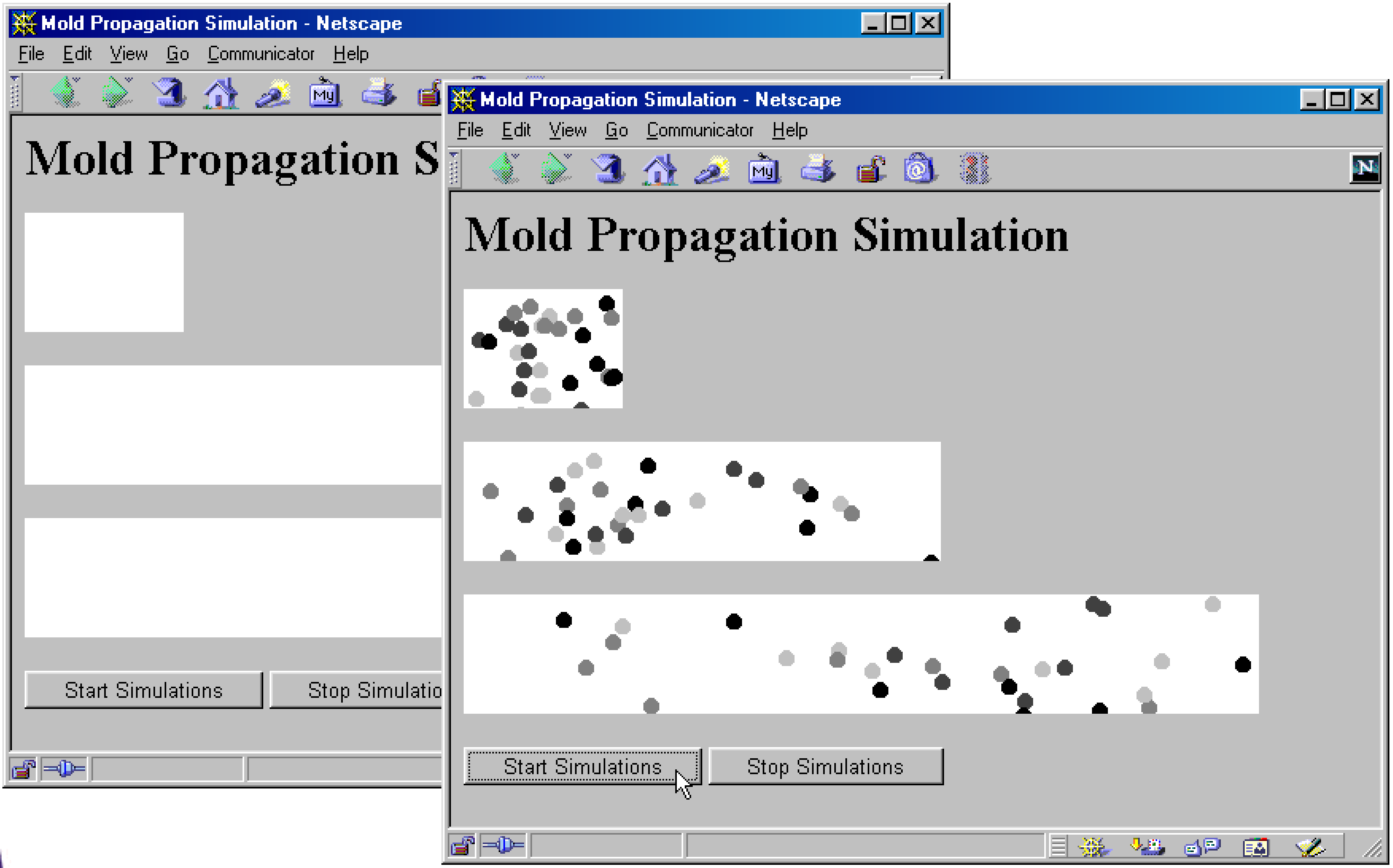
```
public class RandomCircles extends Applet
                           implements Runnable {
  private boolean drawCircles = false;

  public void startCircles() {
    Thread t = new Thread(this);
    t.start();
  }

  public void run() {
    Color[] colors = { Color.lightGray, Color.gray,
                       Color.darkGray, Color.black };
    int colorIndex = 0;
    int x, y;
    int width = getSize().width;
    int height = getSize().height;

    Graphics g = getGraphics();
    drawCircles = true;
    ...
```

Controlling Applets from JavaScript, Example

- **RandomCircles.java, cont.**

```
     while(drawCircles) {
        x = (int)Math.round(width * Math.random());
        y = (int)Math.round(height * Math.random());
        g.setColor(colors[colorIndex]);
        colorIndex = (colorIndex + 1) % colors.length;
        g.fillOval(x, y, 10, 10);
        pause(0.1);
      }
    }

    public void stopCircles() {
      drawCircles = false;
    }

    private void pause(double seconds) {
      try {
        Thread.sleep((int)(Math.round(seconds * 1000.0)));
      } catch(InterruptedException ie) {}
    }
  }
```

Controlling Applets from JavaScript, Results


Mold Propagation Simulation - Netscape
File Edit View Go Communicator Help
Mold Propagation S
Start Simulations
Stop Simulatio
Mold Propagation Simulation - Netscape
File Edit View Go Communicator Help
Mold Propagation Simulation
Start Simulations
Stop Simulations

Accessing JavaScript from Java

- **Steps**
  1. Obtain and install the `JSObject` class
     - Installed with Netscape 4 (`javar40.jar`)
     - JDK 1.4 includes `JSObject` in `jaws.jar`
       - See Chapter 24 in http://java.sun.com/j2se/1.4.1/docs/guide/plugin/developer_guide/contents.html
  2. Import it in your applet

     ```
     import netscape.javascript.JSObject
     ```
  3. From the applet, obtain a JavaScript reference to the current window

     ```
     JSObject window = JSObject.getWindow(this);
     ```

Accessing JavaScript from Java, cont.

- **Steps, cont.**

4. Read the JavaScript properties of interest
   - Use `getMember` to access properties of the `JSObject`

```
JSObject someForm =
  (JSObject)document.getMember("someFormName");
```

5. Set the JavaScript properties of interest
   - Use setMember to set properties of the `JSObject`

```
document.setMember("bgColor", "red");
```

6. Call the JavaScript methods of interest

```
String[] message = { "An alert message" };
window.call("alert", message);
window.eval("alert('An alert message')");
```

7. Give the applet permission to access its Web page

```
<APPLET CODE=... WIDTH=... HEIGHT=... MAYSCRIPT>
...
</APPLET>
```

Matching Applet Background with Web Page, Example

- **MatchColor.java**

```
import java.applet.Applet;
import java.awt.*;
import netscape.javascript.JSObject;

public class MatchColor extends Applet {
  public void init() {
    JSObject window = JSObject.getWindow(this);
    JSObject document =
     (JSObject)window.getMember("document");
    // E.g., "#ff0000" for red
    String pageColor = (String)document.getMember("bgColor");
    // E.g., parseInt("ff0000", 16) --> 16711680
    int bgColor =
          Integer.parseInt(pageColor.substring(1, 7), 16);
    setBackground(new Color(bgColor));
  }
}
```

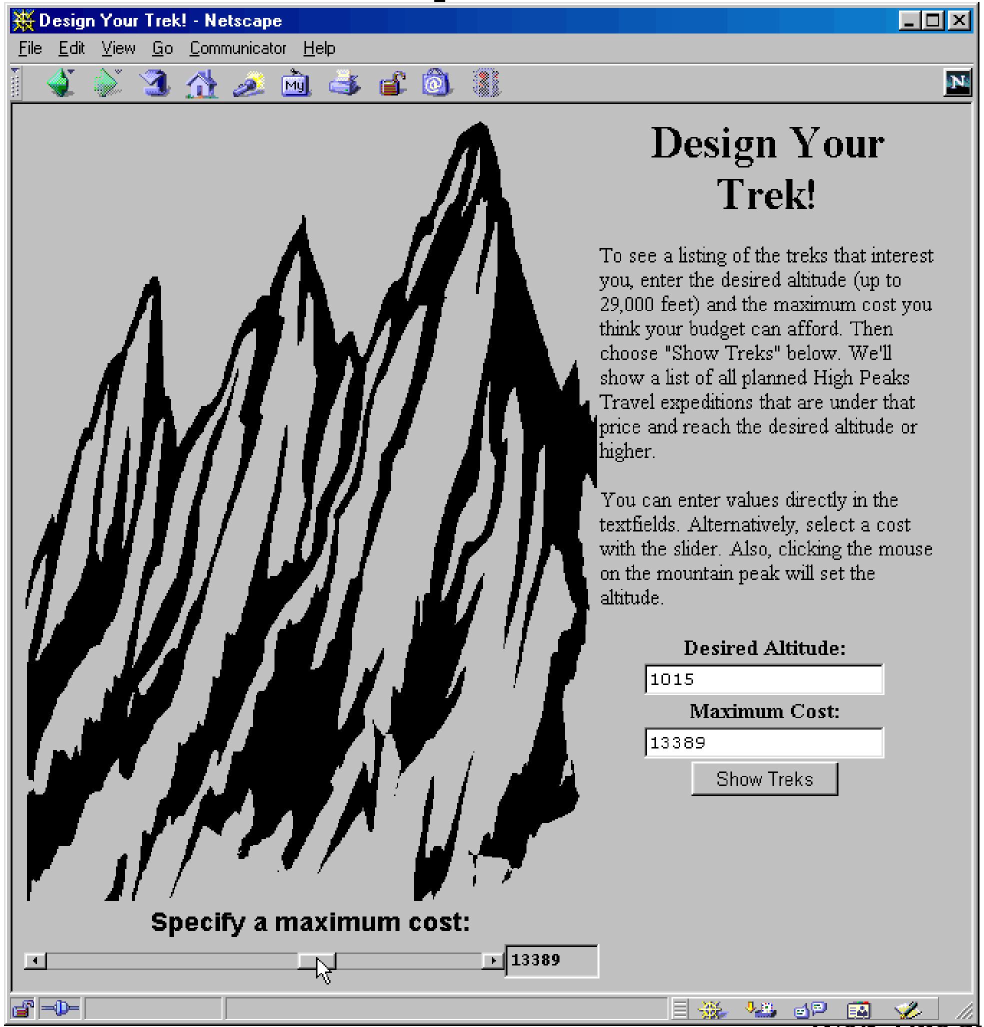
Matching Applet Background with Web Page, Example, cont.

- **MatchColor.html**

```
<HTML>
<HEAD>
  <TITLE>MatchColor</TITLE>
</HEAD>
<BODY BGCOLOR="RED">
<H1>MatchColor</H1>
<APPLET CODE="MatchColor.class"
        WIDTH=300 HEIGHT=300 MAYSCRIPT>
</APPLET>
</BODY>
</HTML>
```

Applet That Controls HTML Form Values, Example

- See on-line example for Everest.html



Design Your Trek! - Netscape

File Edit View Go Communicator Help

Design Your Trek!

To see a listing of the treks that interest you, enter the desired altitude (up to 29,000 feet) and the maximum cost you think your budget can afford. Then choose "Show Treks" below. We'll show a list of all planned High Peaks Travel expeditions that are under that price and reach the desired altitude or higher.

You can enter values directly in the textfields. Alternatively, select a cost with the slider. Also, clicking the mouse on the mountain peak will set the altitude.

Desired Altitude:	1015
Maximum Cost:	13389

Show Treks

Specify a maximum cost: 13389

Summary

- **JavaScript permits you to:**
  - Customize Web pages based on the situation
  - Make pages more dynamic
  - Validate HTML form input
  - Manipulate cookies
  - Control frames
  - Integrate Java and JavaScript