Outline

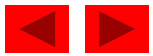
IS400: Development of Business Applications on the Internet
Fall 2004

Instructor: Dr. Boris Jukic

JavaScript: Introduction to Scripting

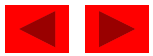
Topics Covered

- Writing simple JavaScript programs.
- Using input and output statements
- Basic memory concepts.
- Arithmetic operators.
- Decision-making statements.
- Relational and equality operators.



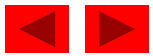
Introduction

- JavaScript scripting language
  - Client-side scripting enhances functionality and appearance
    - Makes pages more dynamic and interactive
    - Pages can produce immediate response without contacting a server
    - Customization is possible on the basis of users' explicit and implicit input
    - Browser has to have a built-in (JavaScript) interpreter
  - Foundation for complex server-side scripting



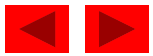
JavaScript: Object-Based Language

- There are three object categories in JavaScript: Native Objects, Host Objects, and User-Defined Objects.
  - Native objects: defined by JavaScript.
    - String, Number, Array, Image, Date, Math, etc.
  - Host objects : supplied and always available to JavaScript by the browser environment.
    - window, document, forms, etc.
  - User-defined objects : defined by the author/programmer
- Initially, we will use host objects created by the browser and their methods and properties



Scripting

- Two approaches to client side scripting:
  - Inline scripting
    - Written in the <body> section of a document
  - JavaScript code embedded in the <head> section



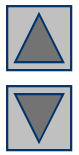
Scripting

- `<script>` tag
  - Indicate that the text is part of a script
  - `type` attribute
    - Specifies the type of file and the scripting language use:
      - Value: "`text/javascript`"
    - IE and Netscape use JavaScript as default scripting language
- `writeln` method of the `document` object
  - Write a line in the document and position the cursor in the next line
  - Does not affect the actual rendering of the HTML document
    - What is being written by JavaScript is the set of html instructions that in turn determine the rendering of the html document

Outline

```
1  <?xml version = "1.0"?>
2  <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
3     "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
4
5  <!-- Fig. 7.1: welcome.html     -->
6  <!-- Displaying a line of text -->
7
8  <html xmlns = "http://www.w3.org/1999/xhtml">
9     <head>
10       <title>A First Program in JavaScript</title>
11
12       <script type = "text/javascript">
13          <!--
14          document.writeln(
15             "<h1>Welcome to JavaScript Programming!</h1>" );
16          // -->
17       </script>
18
19    </head><body></body>
20 </html>
```

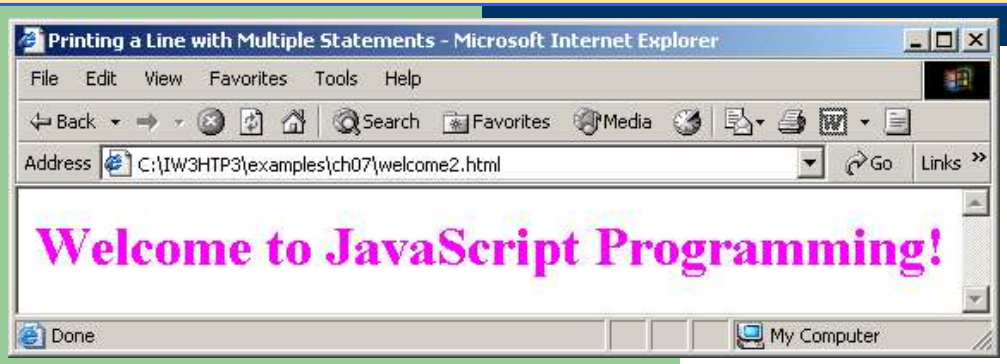
←HTML comment tags will
←result in skipping of the script
←by those browsers that do not
←support scripting



Outline

```
1  <?xml version = "1.0"?>
2  <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
3     "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
4
5  <!-- Fig. 7.2: welcome2.html                    -->
6  <!-- Printing a Line with Multiple Statements -->
7
8  <html xmlns = "http://www.w3.org/1999/xhtml">
9     <head>
10       <title>Printing a Line with Multiple Statements</title>
11
12       <script type = "text/javascript">
13          <!--
14          document.write( "<h1 style = \"color: magenta\">" );
15          document.write( "Welcome to JavaScript " +
16             "Programming!</h1>" );
17          // -->
18       </script>
19
20    </head><body></body>
21 </html>
```

←Escape character in combination with quotation mark: \" will result in insertion of a quotation mark in the string that is actually written by JavaScript



Outline

```
1  <?xml version = "1.0"?>
2  <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
3     "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
4
5  <!-- Fig. 7.3: welcome3.html    -->
6  <!-- Printing Multiple Lines    -->
7
8  <html xmlns = "http://www.w3.org/1999/xhtml">
9     <head><title>Printing Multiple Lines</title>
10
11       <script type = "text/javascript">
12          <!--
13          document.writeln( "<h1>Welcome to<br />JavaScript" +
14             "<br />Programming!</h1>" );
15          // -->
16       </script>
17
18    </head><body></body>
19 </html>
```

←New line of the html document in a browser is determined by an html
 element

Outline

```
1  <?xml version = "1.0"?>
2  <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
3     "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
4
5  <!-- Fig. 7.4: welcome4.html                  -->
6  <!-- Printing multiple lines in a dialog box -->
7
8  <html xmlns = "http://www.w3.org/1999/xhtml">
9     <head><title>Printing Multiple Lines in a Dialog Box</title>
10
11       <script type = "text/javascript">
12          <!--
13             window.alert( "Welcome to\nJavaScript\nProgramming!" );
14          // -->
15       </script>
16
17    </head>
18
19    <body>
20       <p>Click Refresh (or Reload) to run this script again.</p>
21    </body>
22 </html>
```

←`alert` method of the
object displays a Dialo

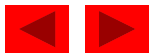

Microsoft Internet Explorer
Welcome to
JavaScript
Programming!
OK


Printing Multiple Lines in a Dialog Box - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address C:\IW3HTP3\examples\ch07\welcome4.html
Go Links
Click Refresh (or Reload) to run this script again.
Done
My Computer

Common Escape Sequences

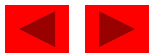
Escape sequence	Description
`\n`	Newline. Position the screen cursor at the beginning of the next line.
`\t`	Horizontal tab. Move the screen cursor to the next tab stop.
`\r`	Carriage return. Position the screen cursor to the beginning of the current line; do not advance to the next line. Any characters output after the carriage return overwrite the characters previously output on that line.
`\\`	Backslash. Used to represent a backslash character in a string.
`\"`	Double quote. Used to represent a double quote character in a string contained in double quotes. For example, `window.alert( "\"in quotes\"" );` displays `"in quotes"` in an `alert` dialog.
`\'`	Single quote. Used to represent a single quote character in a string. For example, `window.alert( '\'in quotes\'' );` displays `'in quotes'` in an `alert` dialog.

Fig. 7.5 Some common escape sequences.



Dynamic Pages

- A script can adapt the content based on explicit input from the user or other information
  - System clock: Time of day
  - Hidden input
  - Cookies
- User input can be collected by invoking the `prompt` method of a `window` object
  - This will display a dialog box that prompts user for input



Outline

```
1  <?xml version = "1.0"?>
2  <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN"
3     "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
4
5  <!-- Fig. 7.6: welcome5.html -->
6  <!-- Using Prompt Boxes      -->
7
8  <html xmlns = "http://www.w3.org/1999/xhtml">
9     <head>
10       <title>Using Prompt and Alert Boxes</title>
11
12       <script type = "text/javascript">
13          <!--
14          var name; // string entered by the user
15
16          // read the name from the prompt box as a string
17          name = window.prompt( "Please enter your name", "GalAnt" );
18
19          document.writeln( "<h1>Hello, " + name +
20             ", welcome to JavaScript programming!</h1>" );
21          // -->
22       </script>
```

JavaScript is a *loosely typed* language. Variables take on any data type depending on the value assigned.

Value returned by the `prompt` method of the `window` object is assigned to the variable name

"+" symbol can be used for text concatenation as well as arithmetic operator

```
23
24     </head>
25
26     <body>
27     <p>Click Refresh (or Reload) to run this script again.</p>
28     </body>
29 </html>
```

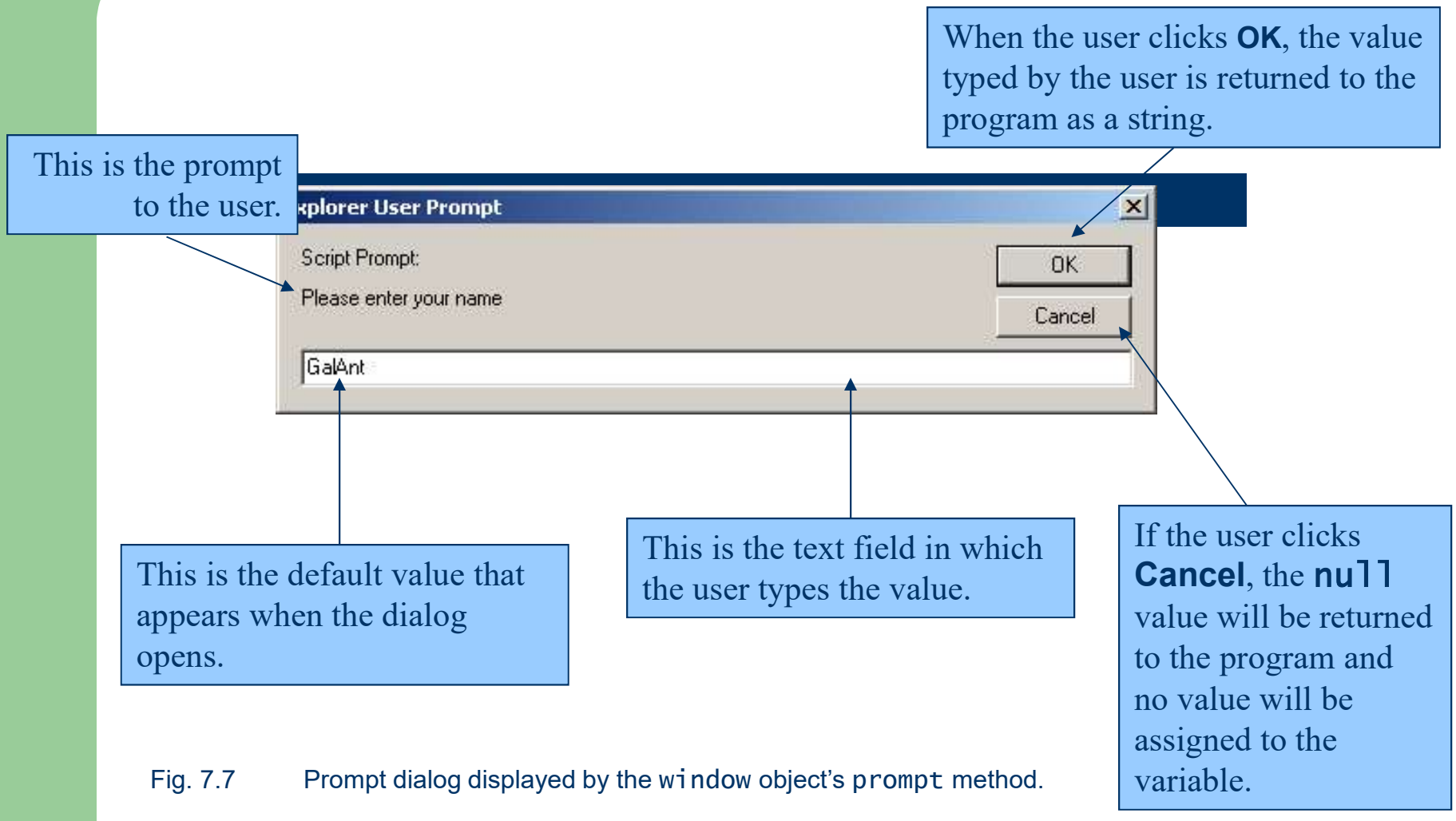


Fig. 7.7 Prompt dialog displayed by the `window` object's `prompt` method.

Simple Script Example: Adding Integers

- The values of numbers to be added are obtained as user inputs colleted through the `window.prompt` method
- `parseInt`
  - Converts its string argument to an integer
  - What happens if the conversion is not done?
    - See example on our web site
- `NaN` (not a number): value returned if non-numerical values are passed to the `paresInt` method

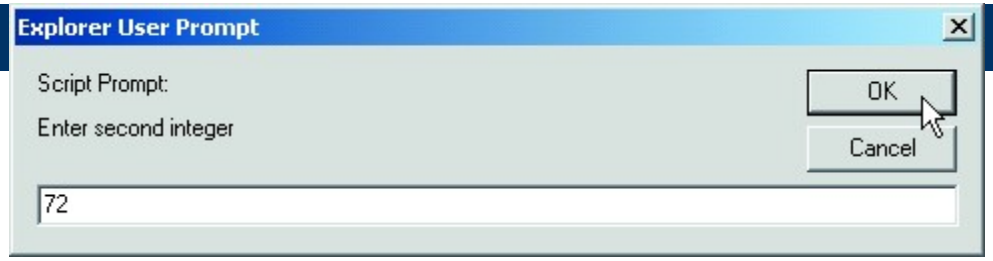
Outline

```
1  <?xml version = "1.0"?>
2  <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
3     "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
4
5  <!-- Fig. 7.8: Addition.html -->
6  <!-- Addition Program        -->
7
8  <html xmlns = "http://www.w3.org/1999/xhtml">
9     <head>
10       <title>An Addition Program</title>
11
12       <script type = "text/javascript">
13          <!--
14          var firstNumber,   // first string entered by user
15              secondNumber,  // second string entered by user
16              number1,       // first number to add
17              number2,       // second number to add
18              sum;           // sum of number1 and number2
19
20          // read in first number from user as a string
21          firstNumber =
22             window.prompt( "Enter first integer", "0" );
23
```

```
24          // read in second number from user as a string
25          secondNumber =
26             window.prompt( "Enter second integer", "0" );
27
28          // convert numbers from strings to integers
29          number1 = parseInt( firstNumber );
30          number2 = parseInt( secondNumber );
31
32          // add the numbers
33          sum = number1 + number2;
34
35          // display the results
36          document.writeln( "<h1>The sum is " + sum + "</h1>" );
37          // -->
38       </script>
39
40    </head>
41    <body>
42       <p>Click Refresh (or Reload) to run the script again</p>
43    </body>
44 </html>
```

Outline


Explorer User Prompt
Script Prompt:
Enter first integer
OK
Cancel
45


Explorer User Prompt
Script Prompt:
Enter second integer
OK
Cancel
72


An Addition Program - Microsoft Internet Explorer
File Edit View Favorites Tools Help
Back Search Favorites Media
Address C:\IW3HTP3\examples\ch07\Addition.html
Go Links
The sum is 117
Click Refresh (or Reload) to run the script again
Done
My Computer

Arithmetic Operators and order of evaluation

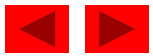
JavaScript operation	Arithmetic operator	Algebraic expression	JavaScript expression
Addition	+	$f + 7$	`f + 7`
Subtraction	-	$p - c$	`p - c`
Multiplication	*	bm	`b * m`
Division	/	x / y or $\frac{x}{y}$ or $x \div y$	`x / y`
Remainder	%	$r \bmod s$	`r % s`

Fig. 7.12 Arithmetic operators.

Operator(s)	Operation(s)	Order of evaluation (precedence)
*, / or %	Multiplication Division Modulus	Evaluated first. If there are several such operations, they are evaluated from left to right.
+ or -	Addition Subtraction	Evaluated last. If there are several such operations, they are evaluated from left to right.

Fig. 7.13 Precedence of arithmetic operators.

Always use parentheses to ensure desired order of evaluation: `(a + b) / 6`



Relational (Inequality and Equality) Operators

Standard algebraic equality operator or relational operator	JavaScript equality or relational operator	Sample JavaScript condition	Meaning of JavaScript condition
Equality operators			
=	==	x == y	x is equal to y
?	!=	x != y	x is not equal to y
Relational operators			
>	>	x > y	x is greater than y
<	<	x < y	x is less than y
	>=	x >= y	x is greater than or equal to y
	<=	x <= y	x is less than or equal to y

Fig. 7.15 Equality and relational operators.

Do NOT confuse relational equality operator "==" with an assignment operator "="

Outline

```
1  <?xml version = "1.0"?>
2  <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN"
3     "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
4
5  <!-- Fig. 7.16: welcome6.html    -->
6  <!-- Using Relational Operators -->
7
8  <html xmlns = "http://www.w3.org/1999/xhtml">
9     <head>
10       <title>Using Relational Operators</title>
11
12       <script type = "text/javascript">
13          <!--
14          var name, // string entered by the user
15             now = new Date(),      // current date and time
16             hour = now.getHours(); // current hour (0-23)
17
18          // read the name from the prompt box as a string
19          name = window.prompt( "Please enter your name", "GalAnt" );
20
21          // determine whether it is morning
22          if ( hour < 12 )
23             document.write( "<h1>Good Morning, " );
24
```

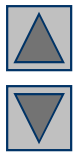
"now" is a new instance of JavaScript native object `Date`. It can invoke all the methods of that object class

Note that conversion to integer type was not needed when the value was returned by the `getHours` method

```
25          // determine whether the time is PM
26          if ( hour >= 12 )
27          {
28             // convert to a 12 hour clock
29             hour = hour - 12;
30
31             // determine whether it is before 6 PM
32             if ( hour < 6 )
33                document.write( "<h1>Good Afternoon, " );
34
35             // determine whether it is after 6 PM
36             if ( hour >= 6 )
37                document.write( "<h1>Good Evening, " );
38          }
39
40          document.writeln( name +
41             ", welcome to JavaScript programming!</h1>" );
42          // -->
43       </script>
44
45    </head>
46
```

Outline

```
47    <body>
48       <p>Click Refresh (or Reload) to run this script again.</p>
49    </body>
50    </html>
```



Outline

Order of Precedence for the Basic Operators

highest

lowest

Operators	Associativity	Type
* / %	left to right	multiplicative
+ -	left to right	additive
< <= > >=	left to right	relational
== !=	left to right	equality
=	right to left	assignment

Fig. 7.17 Precedence and associativity of the operators discussed so far.