Introduction to Scripting

Outline

Objectives

- In this lesson, you will learn:
  - To be able to write simple JavaScript programs.
  - To be able to use input and output statements.
  - To understand basic memory concepts.
  - To be able to use arithmetic operators.
  - To understand the precedence of arithmetic operators.
  - To be able to write decision-making statements.
  - To be able to use relational and equality operators.

7.1 Introduction

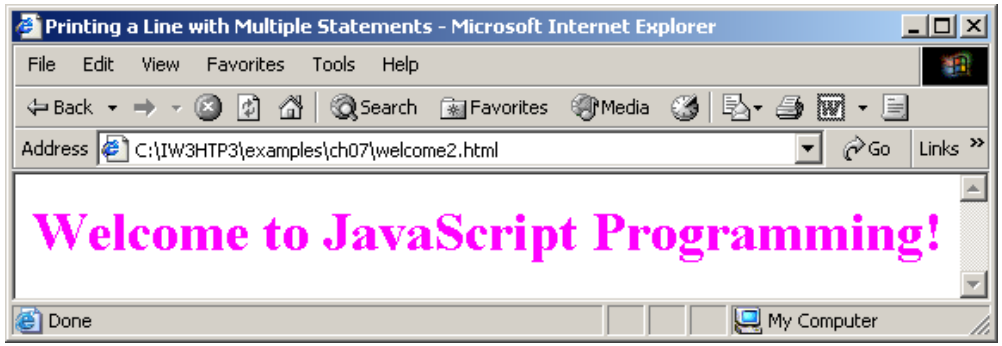
- JavaScript scripting language
  - Enhances functionality and appearance
  - Client-side scripting
    - Makes pages more dynamic and interactive
  - Foundation for complex server-side scripting
  - Program development
  - Program control

7.2 Simple Program: Printing a Line of Text in a Web Page

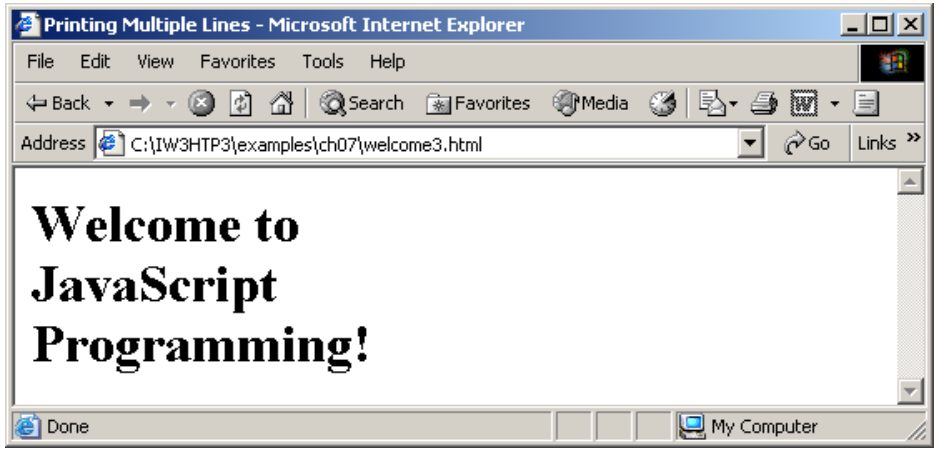
- Inline scripting
  - Written in the `<body>` of a document
  - `<script>` tag
    - Indicate that the text is part of a script
    - `type` attribute
      - Specifies the type of file and the scripting language use
    - `writeln` method
      - Write a line in the document
    - Escape character (\ )
      - Indicates “special” character is used in the string
    - `alert` method
      - Dialog box

```
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>
```

```
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>
```

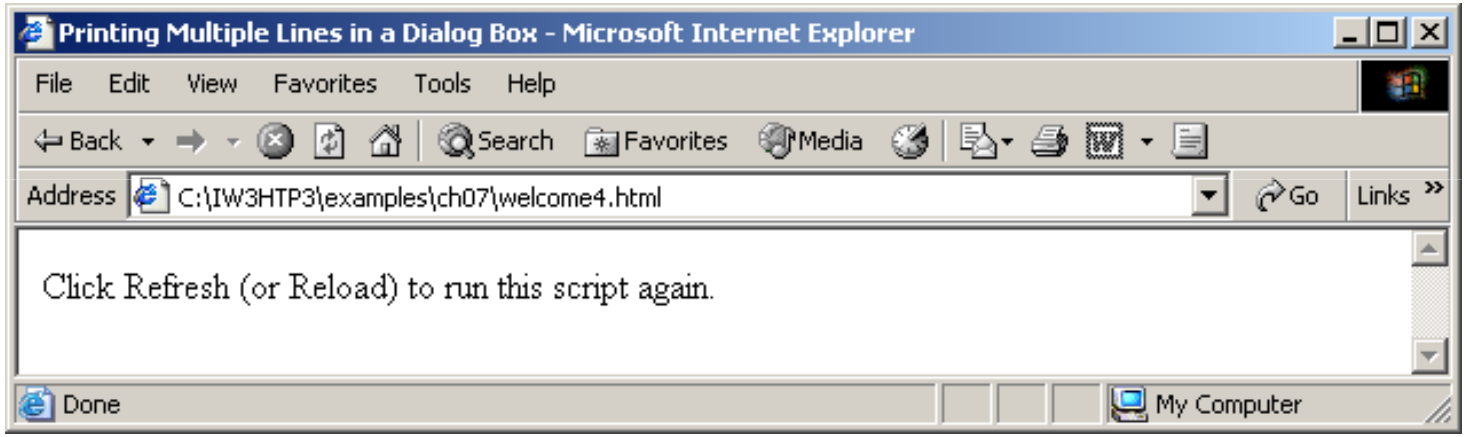


```
1  <?xml version = "1.0"?>
2  <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.0 Strict//EN"
3     "http://www.w3.org/TR/xhtml1/DTD/xhtml1-strict.dtd">
4
5  <!-- Fig. 7.3: welcome3.html   -->
6  <!-- Printing Multiple Lines   -->
7
8  <html xmlns = "http://www.w3.org/1999/xhtml">
9     <head><title>Printing 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>
```



```
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>
```


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

7.2 Simple Program: Printing a Line of Text in a Web Page

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.

7.3.1 Dynamic Welcome Page

- A script can adapt the content based on input from the user or other variables

```
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>
```

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

7.3.1 Dynamic Welcome Page

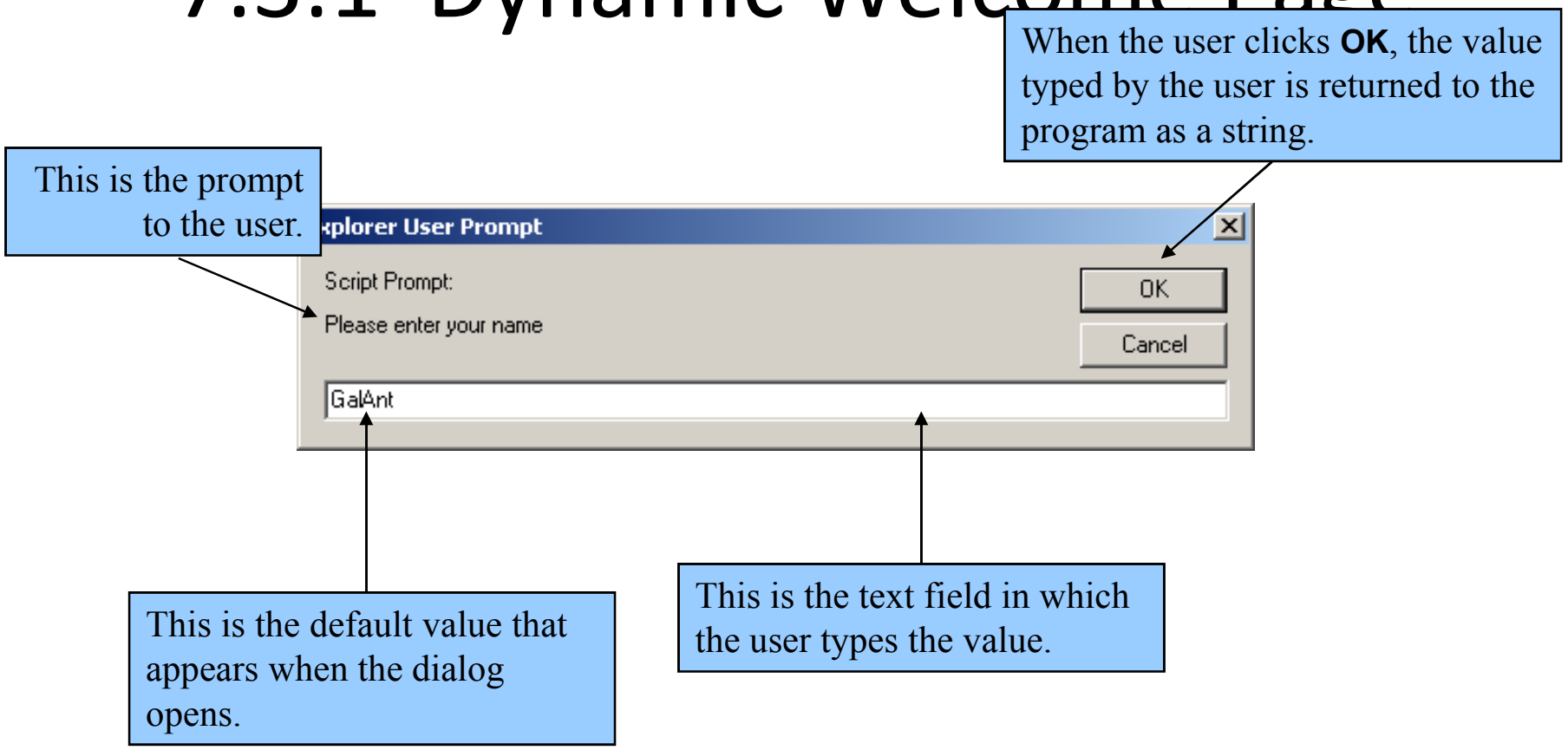


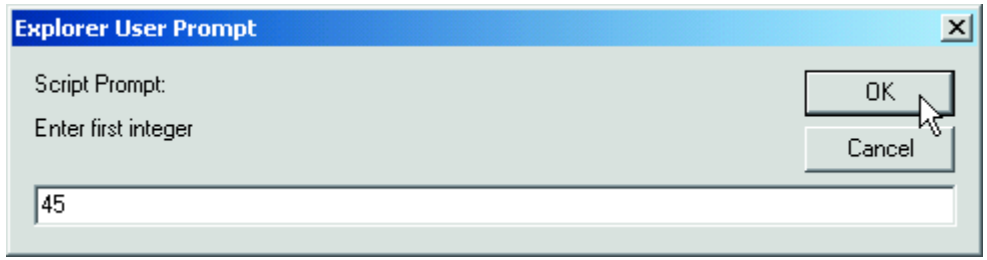
Fig. 7.7 Prompt dialog displayed by the `window` object's `prompt` method.

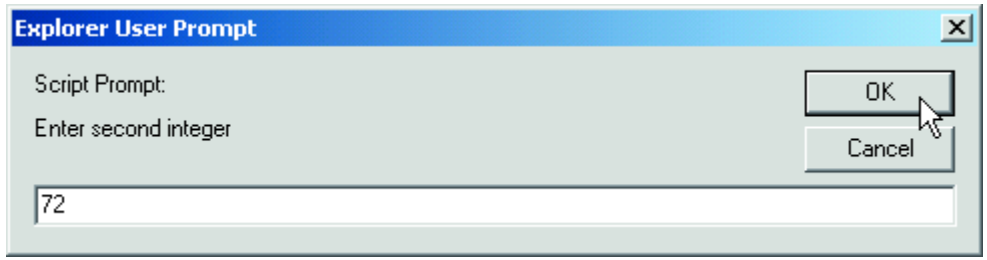
7.3.2 Adding Integers

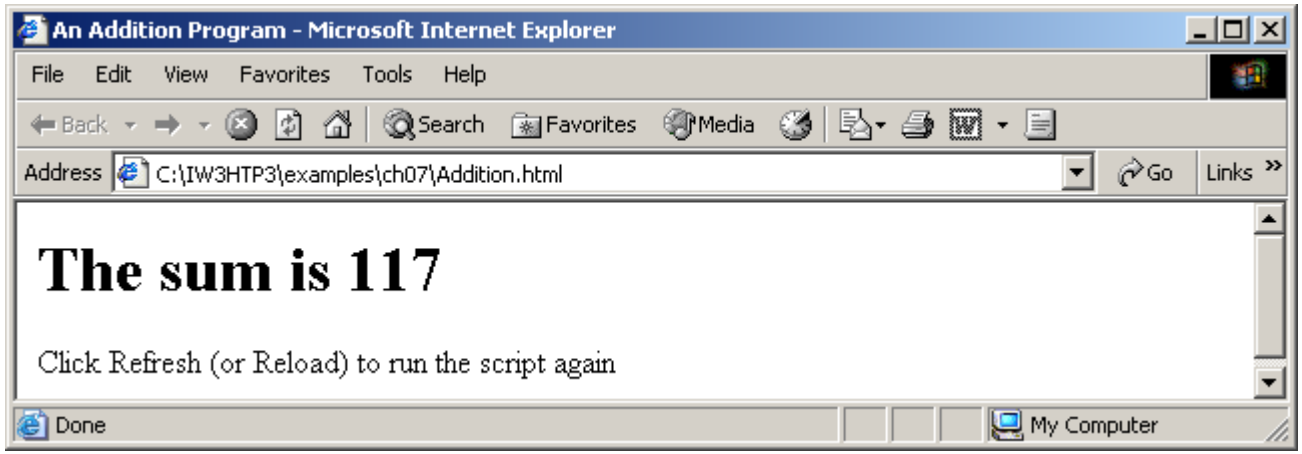
- Prompt user for two integers and calculate the sum (Fig. 7.8)
- `NaN` (not a number)
- `parseInt`
  - Converts its string argument to an integer

```
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>
```


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

7.4 Memory Concepts

- Variable names correspond to locations in the computer's memory
- Every variable has a name, a type, and a value
- Read value from a memory location
  - nondestructive

7.4 Memory Concepts

Fig. 7.9 Memory location showing the name and value of variable `number1`.

7.4 Memory Concepts

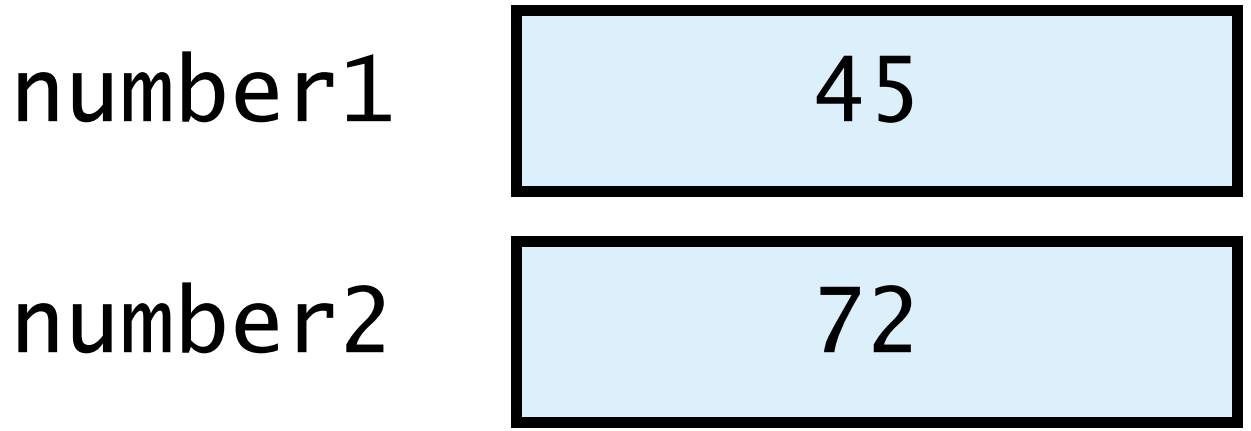


Fig. 7.10 Memory locations after values for variables `number1` and `number2` have been input.

7.4 Memory Concepts

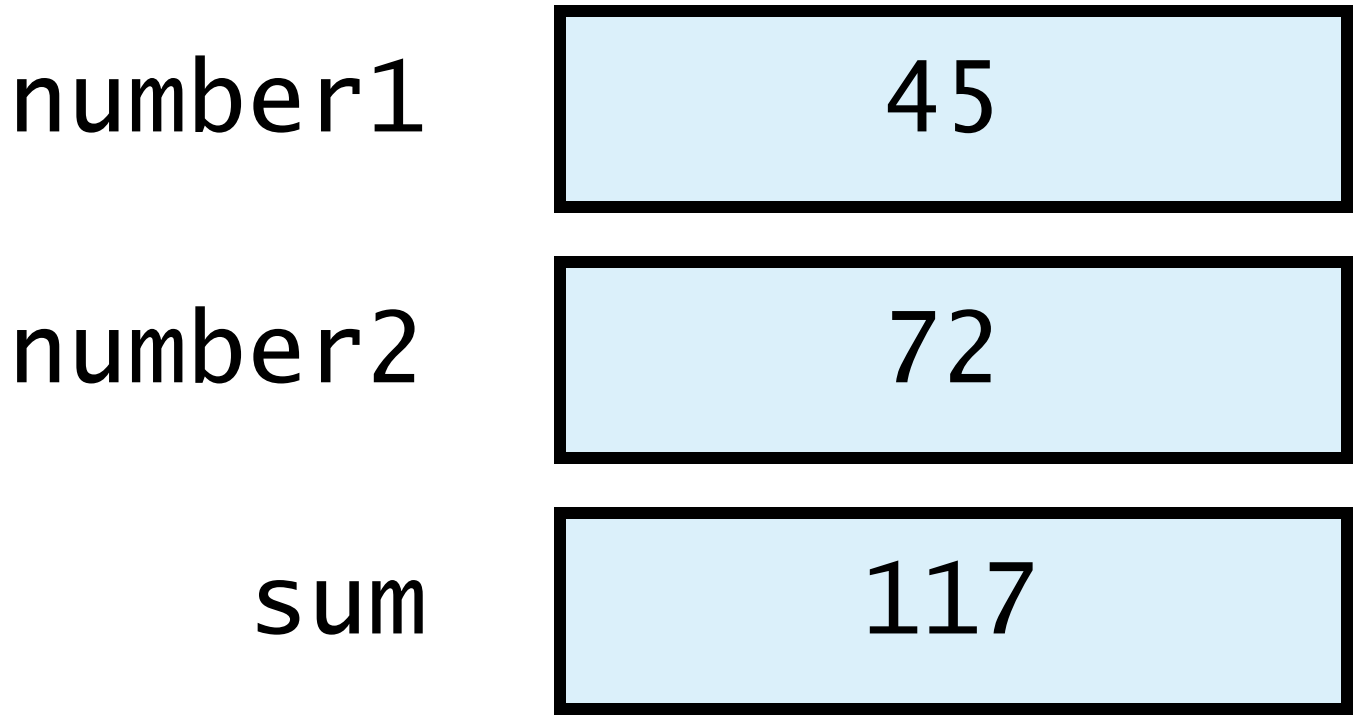


Fig. 7.11 Memory locations after calculating the sum of `number1` and `number2`.

7.5 Arithmetic

- Many scripts perform arithmetic calculations
  - Expressions in JavaScript must be written in straight-line form

7.5 Arithmetic

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 $x y$	`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 second. 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.

7.5 Arithmetic

Step 1. `y = 2 * 5 * 5 + 3 * 5 + 7;`

`2 * 5 is 10` *(Leftmost multiplication)*

Step 2. `y = 10 * 5 + 3 * 5 + 7;`

`10 * 5 is 50` *(Leftmost multiplication)*

Step 3. `y = 50 + 3 * 5 + 7;`

`3 * 5 is 15` *(Multiplication before addition)*

Step 4. `y = 50 + 15 + 7;`

`50 + 15 is 65` *(Leftmost addition)*

Step 5. `y = 65 + 7;`

`65 + 7 is 72` *(Last addition)*

Step 6. `y = 72;` *(Last operation—place 72 into y)*

Fig. 7.14 Order in which a second-degree polynomial is evaluated.

7.6 Decision Making: Equality and Relational Operators

- Decision based on the truth or falsity of a condition
  - Equality operators
  - Relational operators

7.6 Decision Making: Equality and Relational Operators

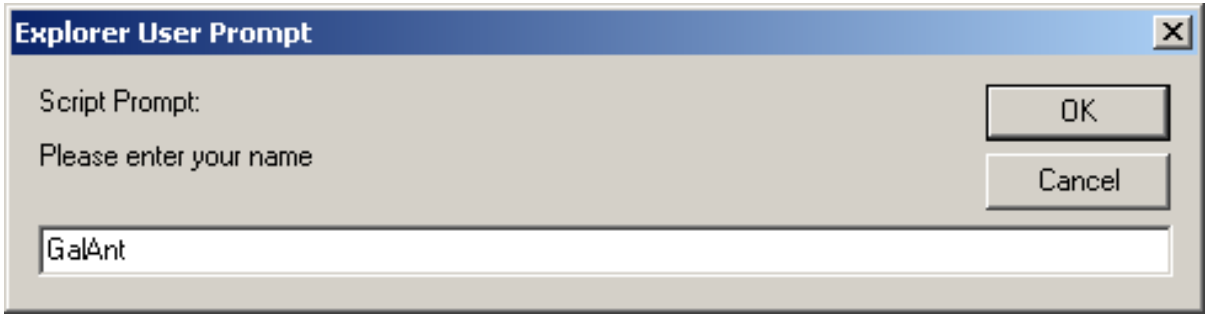
Standard algebraic equality operator or relational operator	JavaScript equality or relational operator	Sample JavaScript condition	Meaning of JavaScript condition
Equality operators			
=	==	x == y	x is equal to y
?	!=	x != y	x is not equal to y
Relational operators			
>	>	x > y	x is greater than y
<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

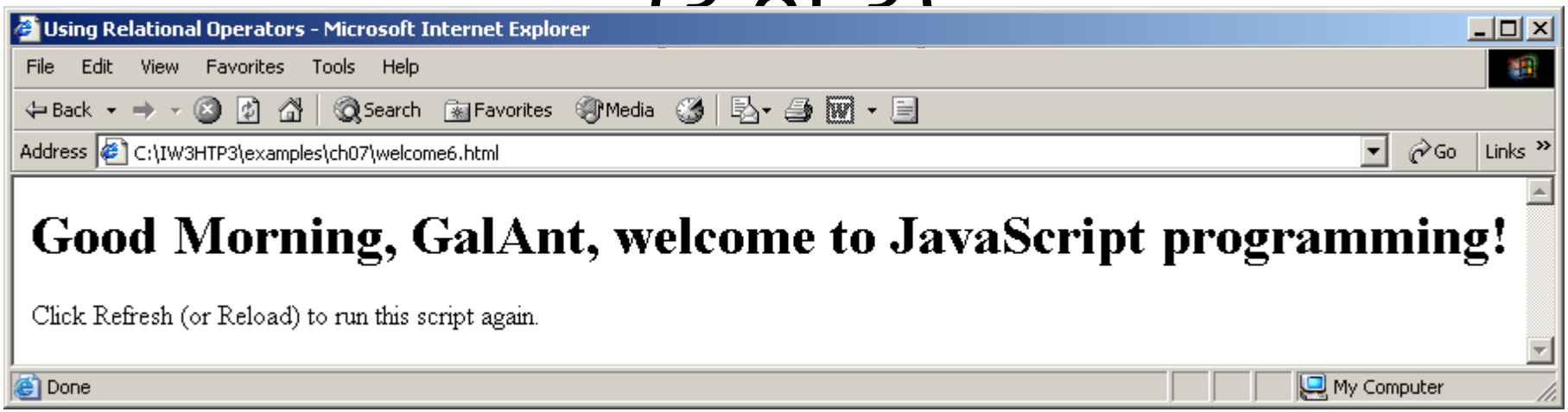
```
1  <?xml version = "1.0"?>
2  <!DOCTYPE html PUBLIC "-//W3C//DTD XHTML 1.1//EN"
3     "http://www.w3.org/TR/xhtml11/DTD/xhtml11.dtd">
4
5  <!-- Fig. 7.16: welcome6.html    -->
6  <!-- Using Relational Operators -->
7
8  <html xmlns = "http://www.w3.org/1999/xhtml">
9     <head>
10       <title>Using 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
```

```
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
```

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



(2 of 2)



7.6 Decision Making: Equality and Relational Operators

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.