JavaScript

Characteristics

- Case sensitive
- Object oriented
- Produces an HTML document
- Dynamically typed
- Standard operator precedence
- Overloaded operators
- Reserved words

Characteristics

- Division with / is not integer division
- Modulus (%) is not an integer operator
- 5 / 2 yields 2.5
- 5.1 / 2.1 yields 2.4285714285714284
- 5 % 2 yields 1
- 5.1 % 2.1 yields 0.8999999999999995

Characteristics

- " and ' can be used in pairs
- Scope rules for variables
- Strings are very common data types
- Rich set of methods available
- Arrays have dynamic length
- Array elements have dynamic type
- Arrays are passed by reference
- Array elements are passed by value

JavaScript Topics

- code placement
- document.writeln
- document tags
- window.alert
- user input/output
- parseInt and parseFloat
- arithmetic
- arithmetic comparisons
- for loops
- while loops
- do-while loops
- if-else
- variable values in tags
- math library
- switch
- break
- labeled break
- continue
- Booleans

JavaScript Topics

- functions
- random numbers
- rolling dice
- form input
- form output
- submit buttons
- games

- arrays
- searching
- strings
- substrings
- string conversions
- markup methods

JavaScript’s Uses Include:

- “Dynamic” web-pages
  - What’s DHTML? (in a second)
- Image manipulation
  - Swapping, rollovers, slide shows, etc.
- Date, time stuff (e.g. clocks, calendars)
- HTML forms processing
  - Verifying input; writing output to fields
- Cookies

What’s DHTML?

- Purpose: make dynamic / interactive web-pages on the client side
- Use of a collection of technologies together to do this, including
    - Markup language (HTML, XML, etc.)
    - Scripting language (JavaScript, etc.)
    - Presentation language (CSS etc.)

Other References

- CS453 Virtual Lab exercises
- *The Web Wizard's Guide To JavaScript*, Steven Estrella, Addison-Wesley
- *JavaScript for the World Wide Web*, Gesing and Schneider, Peachpit Press
- http://www.w3schools.com/js/
- *www.javascript.com*
- E-books in UVa's Safari On-line Books: http://proquest.safaribooksonline.com/search

Browser Compatability

- Use of:

```
<script type=”text/javascript" language=”javascript" >
<!--

// ends script hiding -->
</script>
```

- “language=“ for pre IE5 and NS6
- Comment for very old browsers (e.g. IE2)
  - BTW, comments in HTML vs. in JavaScript

Organization of JavaScript

- Create functions (non-OO style)
  - Define in header
  - Or load a .js file in header:

    ```
    <script type="text/javascript" language="javascript"
    src="mylib.js">
    ```
- Functions called in <BODY>
  - Often in response to events, e.g.

    ```
    <input type="button"… onclick="myFunc(…);">
    ```
- Global variables

JavaScript

- Programming by example

document.writeln

```
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<!– Welcome to JavaScript -->
<HEAD>
<TITLE> Welcome to JavaScript </TITLE>
<SCRIPT TYPE="text/javascript">
          document.writeln( "<FONT COLOR='magenta'><H1>Welcome to ",
           "JavaScript Programming!</H1></FONT>" );
</SCRIPT>
</HEAD>
<BODY>
</BODY>
</HTML>
```

document.write

```
<!DOCTYPE html PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<HEAD>
<TITLE> Using document.write </TITLE>
<SCRIPT TYPE="text/javascript">
        document.write (   "<H1>Welcome to ");
        document.writeln(   "JavaScript Programming!</H1>" );
</SCRIPT>
</HEAD>
<BODY>
</BODY>
</HTML>
```

window.alert

```
<!DOCTYPE HTML PUBLIC "-//W3C//DTD HTML 4.0 Transitional//EN">
<HTML>
<HEAD>
<TITLE> Using window.alert </TITLE>
<SCRIPT TYPE="text/javascript">
        window.alert( "Welcome to\nJavaScript\nProgramming!" );
</SCRIPT>
</HEAD>
<BODY>
<P>Click Refresh (or Reload) to run this script again.</P>
</BODY>
</HTML>
```

User input/output

```
<SCRIPT TYPE="text/javascript">
        var firstNumber,   // first string entered by user
        secondNumber,   // second string entered by user
        number1,           // first number to add
        number2,           // second number to add
        sum;                 // sum of number1 and number2
        // read in first number from user as a string
        firstNumber = window.prompt("Enter first integer", "0" );
        // read in second number from user as a string
        secondNumber = window.prompt( "Enter second integer", "0" );
        // convert numbers from strings to integers
        firstNumber = parseInt(firstNumber);
        number2 = parseInt( secondNumber );
        // add the numbers
        sum = firstNumber + number2;
        // display the results
        document.writeln( "<H1>The sum is " + sum + "</H1>" );
</SCRIPT>
```

Functions

```
<SCRIPT TYPE = "text/javascript">
          var input1 = window.prompt( "Enter first number", "0" );
          var input2 = window.prompt( "Enter second number", "0" );
          var input3 = window.prompt( "Enter third number", "0" );
          var value1 = parseFloat( input1 );
          var value2 = parseFloat( input2 );
          var value3 = parseFloat( input3 );
          var maxValue = maximum( value1, value2, value3 );
          document.writeln( "First number: " + value1 +
         "<BR>Second number: " + value2 +
             "<BR>Third number: " + value3 +
         "<BR>Maximum is: " + maxValue );
          // maximum method definition (called from above)
          function maximum( x, y, z ) {
                    return Math.max( x, Math.max( y, z ) );
      }
</SCRIPT>
```

Random Numbers

```
<SCRIPT TYPE="text/javascript">
        var value;
        document.writeln( "<H1>Random Numbers</H1>" +
          "<TABLE BORDER = '1' WIDTH = '50%'><TR>" );
        for ( var i = 1; i <= 20; i++ ) {
          value = Math.floor( 1 + Math.random() * 6 );
          document.writeln( "<TD>" + value + "</TD>" );
          if ( i % 5 == 0 && i != 20 )
            document.writeln( "</TR><TR>" );
        }
        document.writeln( "</TR></TABLE>" );
</SCRIPT>
```

Roll the Die

```
<SCRIPT TYPE="text/javascript">
        var frequency1 = 0, frequency2 = 0,
        frequency3 = 0, frequency4 = 0,
        frequency5 = 0, frequency6 = 0, face;
        // summarize results
        for ( var roll = 1; roll <= 6000; ++roll ) {
          face = Math.floor( 1 + Math.random() * 6 );
          switch ( face ) {
          case 1: ++frequency1; break;
          case 2: ++frequency2; break;
          case 3: ++frequency3; break;
          case 4: ++frequency4; break;
          case 5: ++frequency5; break;
          case 6: ++frequency6; break;
          }
        }
        document.writeln( "<TABLE BORDER = '1' WIDTH = '50%'>" ); .....
```

Rules of Craps

- First roll:
    - 7 or 11 is a win
    - 2, 3, or 12 is a lose
    - otherwise, roll becomes your point
- Subsequent rolls:
    - rolling your point is a win
    - 7 or 11 is a lose
    - otherwise continue to roll

Craps

```
<SCRIPT TYPE="text/javascript">
// variables used to test the state of the game
var WON = 0, LOST = 1, CONTINUE_ROLLING = 2;
// other variables used in program
var firstRoll = true,    // true if first roll
sumOfDice = 0,        // sum of the dice
myPoint = 0,           // point if no win/loss on first roll
gameStatus = CONTINUE_ROLLING;  // game not over yet
```

Craps

```
// process one roll of the dice
function play() {
   if ( firstRoll ) {
      // first roll of the dice
      sumOfDice = rollDice();
      switch ( sumOfDice ) {
         case 7: case 11:
            // win on first roll
            gameStatus = WON;
            document.craps.point.value = ""; // clear point field
            break;
         case 2: case 3: case 12:
            // lose on first roll
            gameStatus = LOST;
            document.craps.point.value = ""; // clear point field
            break;
```

Craps

```
default:
        // remember point
        gameStatus = CONTINUE_ROLLING;
        myPoint = sumOfDice;
        document.craps.point.value = myPoint;
        firstRoll = false;
      }
  }
  else {
    sumOfDice = rollDice();
    if ( sumOfDice == myPoint ) gameStatus = WON;
    else if ( sumOfDice == 7 )  gameStatus = LOST;
  }
```

Craps

```
if ( gameStatus == CONTINUE_ROLLING ) window.alert ("Roll again");
   else {
      if ( gameStatus == WON ) {
         window.alert ("Player wins. " + "Click Roll Dice to play again.");
         document.craps.point.value = " ";
      }
      else {
         window.alert ("Player loses. " + "Click Roll Dice to play again.");
         document.craps.point.value = " ";
      }
  firstRoll = true;
  }
}
```

Craps

```
// roll the dice
function rollDice() {
   var die1, die2, workSum;
   die1 = Math.floor( 1 + Math.random() * 6 );
   die2 = Math.floor( 1 + Math.random() * 6 );
   workSum = die1 + die2;
   document.craps.firstDie.value = die1;
   document.craps.secondDie.value = die2;
   document.craps.sum.value = workSum;
   return workSum;
}
</SCRIPT>
```

Poker Hand

```
<SCRIPT TYPE="text/javascript">
function rand1toN(N) {
   return Math.floor( 1+Math.random()*N );
   }
function dealcard(card) {
   var rank = new Array(0,"A","2","3","4","5","6","7",
         "8","9","T","J","Q","K");
   var suit = new Array(0, "Spades", "Hearts", "Diamonds", "Clubs");
   card[0] = rank[rand1toN(13)];
   card[1] = suit[rand1toN(4)];
}
```

Poker Hand

```
var card = new Array(2);
var player = new Array(10);
var dealer = new Array(10);
for (var i=0; i<=4; i++) {
   dealcard(card);
   player[i*2] = card[0];
   player[i*2+1] = card[1];
   dealcard(card);
   dealer[i*2] = card[0];
   dealer[i*2+1] = card[1];
}
```

Poker Hand

```
document.writeln("<H1> PLAYER </H1>");
document.writeln("<TABLE BORDER='1' >");
for (var i=0; i<=4; i++) {
   document.writeln("<TR><TD><P>" + player[i*2] + "</TD>"
     + "<TD><P>" + player[i*2+1] + "</TD></TR>");
}
document.writeln("</TABLE> </HTML>");
</SCRIPT>
```

Character Processing

```
<SCRIPT TYPE="text/javascript">
var s = "ZEBRA";
var s2 = "AbCdEfG";
document.writeln( "<P> Character at index 0 in '"+
   s + "' is " + s.charAt( 0 ) );
document.writeln( "<BR>Character code at index 0 in '" +
   s + "' is " + s.charCodeAt( 0 ) + "</P>" );
document.writeln( "<P>'" + String.fromCharCode( 87, 79, 82, 68 ) +
   "' contains character codes 87, 79, 82 and 68</P>" );
document.writeln( "<P>'" + s2 + "' in lowercase is '" +
   s2.toLowerCase() + "'" );
document.writeln( "<BR>'" + s2 + "' in uppercase is '" +
   s2.toUpperCase() + "'</P>" );
</SCRIPT>
```

Dates and Times

```
<SCRIPT LANGUAGE = "JavaScript">
var current = new Date();
document.writeln(current);
document.writeln( "<H1>String representations and valueOf</H1>" );
document.writeln( "toString: " + current.toString() +
    "<BR>toLocaleString: " + current.toLocaleString() +
    "<BR>toUTCString: " + current.toUTCString() +
    "<BR>valueOf: " + current.valueOf() );
document.writeln( "<H1>Get methods for local time zone</H1>" );
document.writeln( "getDate: " + current.getDate() +
   "<BR>getDay: " + current.getDay() + "<BR>getMonth: " +
   current.getMonth() + "<BR>getFullYear: " + current.getFullYear() +
   "<BR>getTime: " + current.getTime() + "<BR>getHours: " +
   current.getHours() + "<BR>getMinutes: " + current.getMinutes() +
   "<BR>getSeconds: " + current.getSeconds() +  "<BR>getMilliseconds: " +
   current.getMilliseconds() + "<BR>getTimezoneOffset: " +
   current.getTimezoneOffset() );
```

Dates and Times

```
document.writeln( "<H1>Specifying arguments for a new Date</H1>" );
var anotherDate = new Date( 1999, 2, 18, 1, 5, 3, 9 );
document.writeln( "Date: " + anotherDate );
document.writeln( "<H1>Set methods for local time zone</H1>" );
anotherDate.setDate( 31 );
anotherDate.setMonth( 11 );
anotherDate.setFullYear( 1999 );
anotherDate.setHours( 23 );
anotherDate.setMinutes( 59 );
anotherDate.setSeconds( 59 );
document.writeln( "Modified date: " + anotherDate );
</SCRIPT>
```

End of Examples