Indexing and Arrays

A common way to refer to many instances of the same thing is to give them a single name and index them. So we have Super Bowl XX, Pope John II, Games of the XXIII Olympiad.

Indexing, A Basic Idea

- Motivation: When there is a large number of similar things that must be referenced and manipulated, it can be inconvenient to think up a unique name for each, and to refer to them by the name.
- For example: Each of the 7 Continents also has a name, but who can remember them? (What if we were referring to city sites of the Olympics?)
- Also, it is difficult to refer to them in a loop since there is no way to enumerate them.
- Concept: Indexing names items by associating a base name and a number – the index – with each.

Indexing Particulars

- Everyday indexing commonly begins with 1
  - May 1, SuperBowl 1, Elizabeth 1
- The number at which indexing begins is its origin
- Many computer languages use 1 as the origin, but for many others, including JavaScript, the index origin is 0

Arrays

- When a variable is indexed it is called an array.
- Arrays represent collections of data values (integers, strings, etc.).
- For example:
  - continent [0] = “Africa”;
  - continent [1] = “Antarctica”;
  - ….
- Elements of an array must all be of the same type
- The index of an array element is also known as a subscript

Notice that x0 and x1 are variable names, while x[0] and x[1] are different elements of array x.
Arrays in JavaScript

- Arrays are instantiated just like the Date and Image objects

- Declaration Keyword Array name Number of elements

  var continent = new Array(7);

- Notice
  - In the parenthesis is the total number of items in the array
  - The total number of elements of the array will be one more than the largest index, since the origin is 0

Indexing Arrays

- To refer to the individual elements of the array, all you have to do is change the index...
- The index value must be an integer constant (1), a variable (myNdex) or expression (myNdex + 1)
- A loop can sweep through all of the elements

  ```javascript
  var continent = new Array(7);
  continent[0] = "Africa";
  continent[1] = "Antarctica";
  continent[2] = "Asia";
  continent[3] = "Oceania";
  continent[4] = "Europe";
  continent[6] = "South America";
  for (myNdex = 0; myNdex < 7; myNdex++)
  {
    document.write("<p>" + continent[myNdex]);
  }
  ```

Initialize the array before trying to loop through it

Combining Indexing, Arrays, Iteration

- A common error is to index beyond the end of the array...

  ```javascript
  var continent = new Array(7);
  continent[0] = "Africa";
  continent[1] = "Antarctica";
  continent[2] = "Asia";
  continent[3] = "Oceania";
  continent[4] = "Europe";
  continent[6] = "South America";
  for (myNdex = 0; myNdex < 7; myNdex++)
  {
    document.write("<p>" + continent[myNdex]);
  }
  ```

To Sum Up Indexes

- Indexing is a general means of naming like things by a base name and a number
- Controls, variables and other objects can be indexed
- JavaScript uses 0 origin indexing