## 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

7 Continents
Africa
Antarctica
Asia
Australia/Oceania
Europe
North America
South America

- Concept: Indexing names items by associating a base name and a number – the index – with each

- Computer notation: Continent[4] = "Europe"

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";
                    continent [2] = "Asia";
                    ….

- 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

```
var continent = new Array(7);

continent[0] = "Africa";
continent[1] = "Antarctica";
continent[2] = "Asia";
continent[3] = "Oceania";
continent[4] = "Europe";
continent[5] = "North America";
continent[6] = "South America";

for (myNdex = 0; myNdex < 7; myNdex=myNdex + 1)
    {
    document.write("<p>" +continent[myNdex]);
    }
```

Initialize the array before trying to loop through it

Africa
Antarctica
Asia
Europe
North America
South America

Combining Indexing, Arrays, Iteration

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

array_continent2.html - Notepad
File Edit Format View Help

```
var continent = new Array(7);

continent[0] = "Africa";
continent[1] = "Antarctica";
continent[2] = "Asia";
continent[3] = "Oceania";
continent[4] = "Europe";
continent[5] = "North America";
continent[6] = "South America";

for (myNdex = 0; myNdex <= 7; myNdex=myl
    {
    document.write("<p>" +continent[myNdex]);
    }
```

Africa
Antarctica
Asia
Oceania
Europe
North America
South America
undefined

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