Arrays

INFO/CSE 100, Autumn 2004
Fluency in Information Technology

http://www.cs.washington.edu/100

Collections in the Real World

- Think about:
  - words in a dictionary
  - list of pets in your household
  - deck of cards
  - books in a library
  - songs on a CD
  - controls in an HTML form
- These things are all *collections* of objects

How can we manage lists of objects?

- We'd like to be able to ...
  - add things to the list
  - look at the elements of the list one by one
  - find out how many things have been put in the list
  - remove things from the list
  - ... among other things

iCCC example

- Consider the iCCC example program
  - There are 4 radio buttons for shot count, 3 radio buttons for cup size, and 4 radio buttons for drink
  - We could give each radio button an *id* and check it individually to see if it is currently selected
  - But it's much cleaner to treat the buttons in each group the same way, and just look at them in turn
- Looping over the elements of a group is often simpler and more flexible than treating them individually
Arrays

- JavaScript (and most other languages) includes *arrays* as the most basic kind of collection.
  - Simple, ordered collections
  - Special syntax for accessing elements by position
- JavaScript arrays can be created
  - by the programmer in the script
  - by the system and provided to the script
    - for example, the elements array in the iCCC program

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Array Example

```html
<head>
<title>Arrays example</title>
<script type="text/javascript">
var petNames = new Array();
petNames[0] = "Jaba";
petNames[1] = "Bingo";
petNames[2] = "Jessica";
petNames[3] = "Sumi";
petNames[4] = "Jennifer";
</script>
</head>
```

*arraysA.html*
JavaScript Indexed Arrays

- An indexed array is a data type that stores a collection of values, accessible by number
  - the values in the array are called the elements of the array
  - the elements (or values) are accessed by index
    - the index of the first value is 0
  - the values in the array can be any type
    - usually all the values are the same type
    - but they can be different from one another if necessary

Array Declaration and Creation

- Arrays can be created several different ways
  - var petNames = new Array();
    - 0-length array with no elements in it yet
  - var studentNames = new Array(102);
    - 102-element array, all of which have the value undefined
  - var myList = ["Sally", "Splat", "Google"];  
    - 3-element array initialized with an array literal
- Arrays have a property that stores the length<br/>&lt;array name&gt;.length
  - you can lengthen or shorten an array by setting the length to a new value

Array Element Access

- Access an array element using the array name and position: &lt;array name&gt; [ &lt;position&gt; ]
- Details:
  - &lt;position&gt; is an integer expression.
  - Positions count from zero
- Update an array element by assigning to it:
  &lt;array name&gt; [ &lt;position&gt; ] = &lt;new element value&gt; ;
Looping Over Array Contents

- The length attribute makes it easy to loop over all the elements of an Array:

```javascript
document.write("Unsorted list of pet names.<br>");
for (var i=0; i<petNames.length; i++) {
    if (i != 0) {
        document.write(",
    }document.write(petNames[i]);
}
```

Deleting Elements

- Change the length property to change the number of elements in the array
  ```javascript
  names.length = 4;
  ```

- Use the delete operator to set a particular entry to the value undefined
  ```javascript
  delete names[0];
  ```

Interesting Functions

- There are several predefined functions available for working with arrays
  ```javascript
  join() ← join all the elements in one long string
  reverse() ← reverse the order of the elements
  sort() ← sort the elements in the array
  concat(...) ← add elements to the array
  etc
  ```

```javascript
document.write("<br>Sorted list of pet names.<br>");
petNames.sort();
...
Array Summary

- Arrays are a collection data type built in to the JavaScript language.
  » Also found in essentially all programming languages
- Indexed access to elements
  » remember, it's 0-based, the first element is element 0
- Elements can be added to an array by specifying the index value in the assignment statement
  ```javascript
  petNames[5] = "Eleanor";
  ```
- There are useful functions available for manipulating arrays