# CompSci 4
# Chap 10
# Nov 7, 2006

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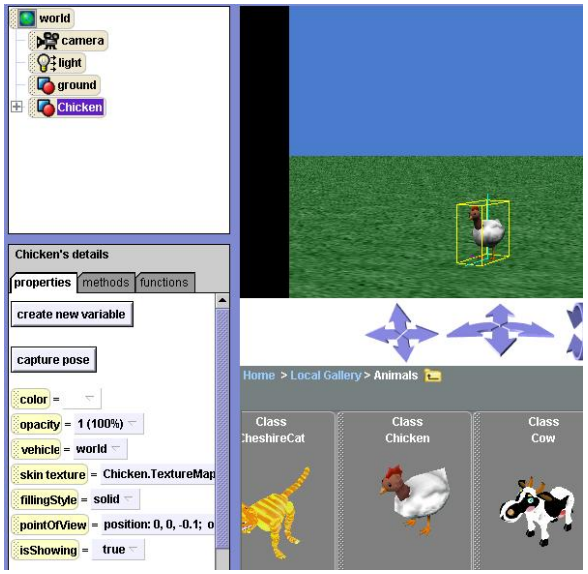
# Announcements

- Assignment 7 – **DRAW a big X through this**
  - There is NO Storyboard due today
  - Assignment 7 is out after Test 2
- Assignment 6 is due today!
- Today
  - Chap 10 – variables and arrays

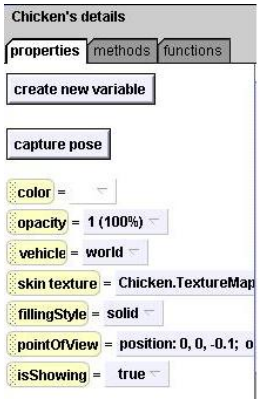
# Review: Properties



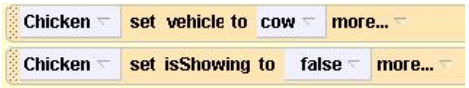

- Where is the class?
- Where is the object?
- A class defines properties
- When an object is created it receives is own set of properties

# State and Changing State

- State of object – each property stores info about the object
  - Example:
    - vehicle
    - isShowing




- State change



# Class-level Variables

- New variables can be added to the properties of an object
  - class-level
- The value of the variable can be changed
  - The variable is **mutable**.
  - Can be used to track state changes.


# Inheritance

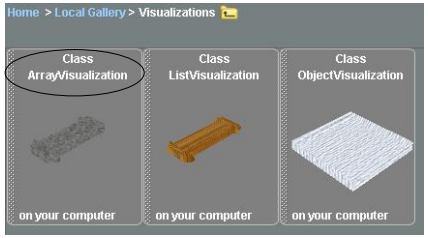
- If an object (and its new variable) are saved out and given a new name, a new class is created.
  - This is inheritance!
  - The new class **inherits** all properties and methods of original class.
    - Did this before by adding new methods to a class and saving it out.

# What is an array?

- An **array** is a collection of objects or information organized in a specific order
- The individual components (elements) are of the same type (all object or all number, etc.)
- Analogy – Music CD
  - Collection of songs listed in order
  - CD player allows you to
    - Play songs in order
    - Play songs by specifying its number
    - Play songs in random order

# Arrays in Alice

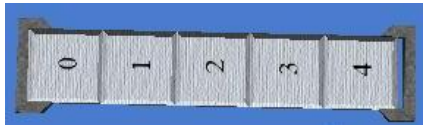
- In Alice, array is a data structure to organize objects or information
- An array is not visible, it is a way of organizing
- But….
  - Alice has a 3D model to help you "see" the array



# Example – Create a visualization of an array of people

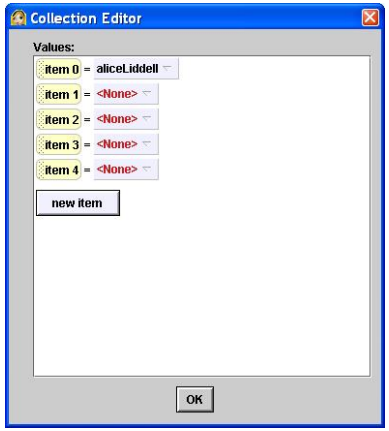
- Add 5 people to the world
- Add an array visualization
- Not an array yet, must add people to the array

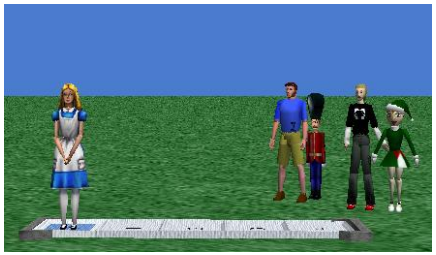
- Positions in array numbered starting with 0




# Initialize array - Add Alice to Array in position 0

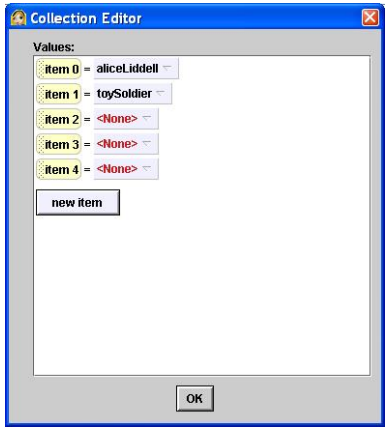
- Alice automatically moves to the 0 position!

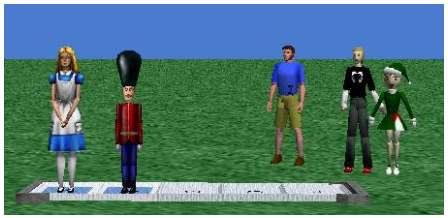


# Add Soldier to the Array

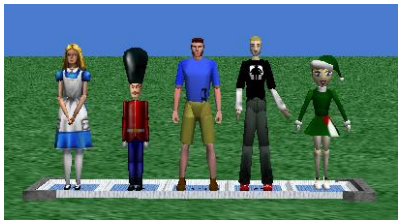
- Soldier moves automatically to position 1 (which is the 2cd position)!



# Add RandomGuy, Skater and Rockette

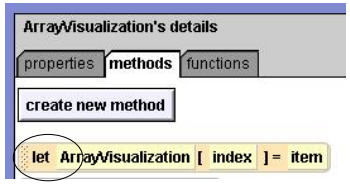
- The array initialization is complete!

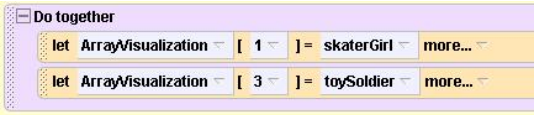


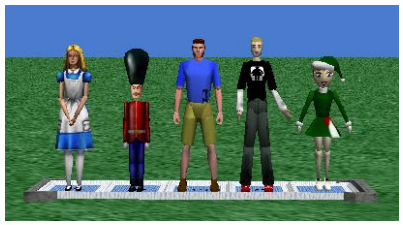
- Set isVisible for arrayVisualization to false
  - Array not seen

# Setting elements in array

- Objects in an array are called **elements**
- Use “let” to set a position in an array
- Using “let”.

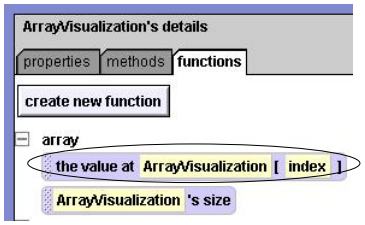


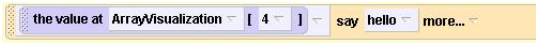



# Accessing elements in an array

- Can specify an element at a particular location in the array

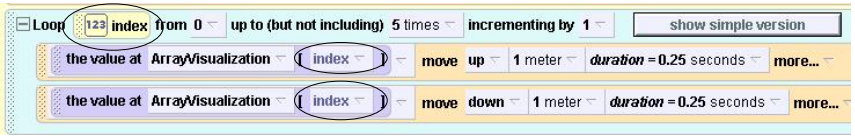




# Repeat for all items in the array – in order

- Use “loop” – complicated version
- Note: index in loop is used in body
- What does this do?




- What does this do?


# Array vs. List

- Array
  - Elements are ordered
  - Can access a particular element – 3
  - Use “Loop” - loop over elements – one at a time, OR every second element, etc
- List
  - Elements are not ordered
  - Use “For all in order”, “For all together” – does something to each element in the list – just don’t know the order this occurs

# Swapping two elements in the array

- Swap the objects at positions 0 (fanDancer) and 3 (duckPrince)
- Add in an ObjectVisualization, this is like a variable for an object. (same folder where ArrayVisualization is)

# Swapping objects at 0 and 3 (cont)

- Only one element at a time can be in a slot in the array. To swap two elements, you have to move one of them out temporarily.
- Move object at index 0 to objectVisualization (this frees up slot 0)

# Swapping objects at 0 and 3 (cont)

- Now you can move the item in slot 3 over to slot 0 (note the duckPrince moved over)
- Now slot 3 is empty

# Swapping objects at 0 and 3 (cont)

- Now move the object that was originally in slot 0 and was saved temporarily in the ObjectVisualization, over to slot 3

# Swapping objects at 0 and 3 (code)

- Here is the code that corresponds to the swapping of the items in slots 0 and 3.

```
let ObjectVisualization = the value at ArrayVisualization [ 0 ] more...
let ArrayVisualization [ 0 ] = the value at ArrayVisualization [ 3 ] more...
let ArrayVisualization [ 3 ] = the value of ObjectVisualization more...
```

# Shuffle the array

- For each item in the array, swap it randomly with another object

# SelectionSort the array

- Find the position of the shortest object
  - Swap that object with the object in position 0
- Find the position of the next shortest object
  - Swap that object with the object in position 1
- Etc…. Until the array is sorted.

# Classwork Today

- Shuffle Array
- Sort Array