CompSci 4
Chap 6 Tips & Techniques
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Announcements

• Read Chapter 7, Sec 1 for next time – Reading Quiz

• Don’t use copy to copy an object!
  – We will learn why later
  – Instead, import the object twice from the class folder

• Lecture on Chap 6, Tips and Techniques
  – Random numbers and random motion, and variables

• Bug in Alice 2.0 – Random numbers don’t always work correctly with integers – use real numbers and use <, <=, > or >=, but not == or != and it works ok

• Alice 2.2 works fine with random numbers

Random Numbers

• Random numbers are used in certain kinds of computer programs

• Examples
  – Security for web applications
  – Encryption for satellite transmissions
  – Gaming programs

• We will look at examples of using random numbers in animations

Built-in functions

• Alice provides built-in functions for generating random numbers
Example

- Move chicken forward a random amount

- The random number function returns a fractional value between 0 and 1

Demo: A range of values

- Can specify a different range of values by specifying a **minimum** and **maximum** value

- In this example, the random number will be a fractional value between 1 and 5

Demo: Integers (whole numbers)

- To generate a random **integer** value
  - Select `integerOnly` from the `more` option and make it `true`

- Random value selected from 1, 2, 3, or 4 - not 5!

Random Hopping

- Rabbit hops (moves up) a random amount
- Rabbit comes back down to the ground, the same random amount

- What happens? How do we fix it?
Local Variable - in a method

- A *local* variable in a method
  - Stores a value
  - Has an initial value
  - Its value can be changed (set)
  - Its value can be used *only in this method*
  - Like a special property, but only for this method

- To create a local variable in a method
  - Click on create variable
  - Give an initial value

- To use a variable’s value
  - Drag the variable into place

Example – create a local variable

- *distance* – will store distance bunny is to move up

Settings a Variable’s value

- Drag variable down and select value

Use Variable’s value - Demo

- Drag and drop *distance* into places where you want to use its value
Set Variable to Random Value - Demo

- Distance is set a random value
- Same value is then used to move up and down
- Use print to print out the value of the variable

Class Variables

- Use “create new variable” under properties to create a class variable for an object
- This “class variable” will maintain the value throughout the running of the world unless you reset it

Random Motion

- In some animations, we want an object to move to a random location. We call this random motion.
- For example, a goldfish swimming in a random motion.

Six Possible Directions

- Six move directions are possible
  - Forward, backward, left, right, up, down
- We will eliminate backward, fish do not swim backward
- To simplify code, take advantage of negative numbers
  - This instruction moves the goldfish right
Storyboard

- Only three move instructions needed
  - Up (move down if negative)
  - Left (move right if negative)
  - Forward (no backward motion)
- Two parameters (min, max) to restrict motion of fish to nearby location

```plaintext
fish.randomMotion
Parameters: min, max
Do together
  fish move up (or down) random distance
  fish move left (or right) random distance
  fish move forward random amount
```

randomMotion

- Minimum distance for move forward is 0

Demo

- To call randomMotion method, specify min and max values

```plaintext
goldfish.randomMotion min = -0.2 max = 0.2
```

Demo

- Repeating the random fish motion over and over again…. (more on this next chapter)
- Change `world.my first method`
Classwork today

- Event handlers
- Random values
- Variables

- NO LOOPS