CompSci 94  
Making Decisions  
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Class Today
- Asking questions and making decisions
- Using functions
- If statements
- Assignment 3 due today

Review 1
- We have five objects in the world: clownFish, BlueTang, PajamaFish, Tortoise, Caiman
- We write the `dance` procedure as a `Swimmer` procedure

They all have tails. Who can call the Dance method?

Review 2
- Suppose we want to modify the `dance` procedure so that the object waves its tail not once but three times? How would we do that?
Review 3

• Suppose we want each object to choose how many times to wave the tail? What type of parameter do we add?

Review 4

• In Dance, suppose we want the fish to turn to face any of the other 4 objects in the world and that object turn to face the fish.
• What type of parameter do we need to add?

Thinking - More Advanced Worlds

• How do you build animations like simulations and video games?
• Need to write code that involves decisions
• Example car-race simulation
  – If the car stays on the road the score increases
  – If the car goes off the road into the stands, the car crashes
  – If the driver gets the car over the finish line, the time is posted and the driver wins!

Logical Expressions

• Decision is made based on current conditions.
• Condition is checked in a logical expression that evaluates to true or false (Boolean) value.
  – car on road  true
  – car over finish line  false
Format of an if

If (condition is true?)
   Action 1 if condition is true
Else
   Action 2 if condition is false

• You will do one of the actions, but not both
• Which action is determined by the condition

If/Else as a picture

• In Alice, a logical expression is used as the condition in an If/Else control structure
• If condition is true do one thing, or if it is false, do something else

Is the Pig to the Panda’s right?

• If pig is to the Panda’s right, we want Pig to move to the other side of Panda
• If pig is to Panda’s left, we want pig to say she is to Panda’s left

How do we make a decision?

• Use an if statement
• The “if statement” is a tile at the bottom. Drag it in and select “True”
• Now we need a condition that evaluates to true or false
Alice has built-in functions!

- Functions calculate a value, may help you answer a question.
- What is the pig’s width?
  - getWidth results in a number
- Is the pig to the Panda’s right?
  - isToTheRightOf results in a true or false value

Example: is the pig to panda’s right?

- Drag in isToTheRightOf from functions into the word true
- Then add in an action for true and one for false

Scenarios for when the code executes

- What happens in this case?
- What happens in this case?

If Panda is greater than 5 units from birch tree, then move closer to it

- Click on true part of if
- Lots of true/false conditions you can select
Relational operators allow a comparison of two items

- >, <, >=, <=, ==, !=
- If pig’s height > 3
- If pig’s width == 4 (means “equal to”)
- If pig’s depth != 5 (means “not equal to”)

If Panda is greater than 4 units from birch tree, then move closer to it

If panda’s distance to birchTree > 4
   Move Panda 3 units closer to the birchTree
Else
   Do nothing

You can leave the else part blank if you don’t have anything to do if it is false

How to create this if?

- Drag the “if” in
- Click on “true” and select “relational operators”, then the >,
- Then 2 numbers

How to create this if?

- Drag in function getDistanceTo over the first number
- Also change second number to 4.0
Result - If with only one action

• It is ok to not have an action for the else

```java
if (this.panda.getDistanceTo(this.birchTree) > 4.0) is true then
  this.panda.move(LEFT, 3.0) add detail
else
  drop statement here
```

Nested If

• What does this code do?

How does the pig say how tall she is?

• First have the pig say “I’m this tall”
• Then click on the saying to add a number also

```java
this.panda.say("I’m this tall")
```

But wait, that is not the pig’s height? How do we get that height?

• And you get two things to say:

```java
this.panda.say("I’m this tall: 2.0")
```
Get the pig’s correct height

- Use a built-in function, drag in “getHeight” over the number 2.0
- Run

Adding Math

- Suppose the pig wants to cheat and say its is 1 unit taller than it really is.
- Click on the down arrow to add more to the number with math

Here is how to add math

- Click on down arrow by number to add to

Pig vs Cheating Pig

1

2
Properties

• A 3D object has its own:
  – *Procedures* – things it can do, like move, turn
  – *Functions* – values it can calculate like distance to, getHeight
  – *Properties* – data on its current state
    • Paint – what color it is
    • Opacity – value of see-through
    • Width, height and depth
    • Vehicle

This lecture covered

• Built-in functions
• Making decisions with an if statement
• Dragging in functions from the function tab for true or false conditions for an if statement
• Combining a string with a number value to create a new string, that could be shown as a string
• Use Math to change a number

Change Properties

• What happens when this code executes?