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 1 answer

• Only those of type swimmer can call the dance proc: BlueTang, ClownFish and PajamaFish
• myFirstMethod:

• The other two are quadrupeds so they don’t have access to the dance procedure
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 2 Answer

• Add in a count loop with a value of 3

Review 3

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

Review 3

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

• WholeNumber
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?
- Pig says she is to Panda’s left

- What happens in this case?
- Pig moves to the other side of Panda
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

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

How to create this if?

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

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 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

Nested If

- What does this code do?

What that code does:

- If the pig distance to tree is greater than 4.0 AND the pig is facing the tree, then the pig says “what a lovely tree”
- If the pig distance to tree is greater than 4 AND the pig is NOT facing the tree, the pig turns to face the tree and moves closer to it
- If the pig distance to the tree is less than or equal to 4, the pig says “I like trees”
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
- And you get two things to say:

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

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

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

Pig vs Cheating Pig

- What happens when this code executes?
Change Properties

• What happens when this code executes?

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