



Programs

- We will treat them like movies, need a basic user story
 - a prose version of what the program does
 - it is a foundation of good software
 - it is like a screen play
 - it exists before any camera or acting is done

User Story

- A basic description of all events that make up the entire saga
- Look for nouns:
 - these are your objects (characters and props)
 - *objects can be visible or invisible, ex. animal vs wind*
- Look for verbs:
 - these are your actions
- Chronological flow of actions
- Algorithm!!!



Today's Learning Goals

- Introduce computation as simulation
- Introduce Alice
- Create objects in Alice
- Invoke methods on objects in Alice
- Create a method in Alice
- Pass a parameter to a method in Alice
- Introduce subclasses

Computers as Simulators

• "The computer is the Proteus of machines. Its essence is its universality, its power to simulate. Because it can take on a thousand forms and serve a thousand functions, it can appeal to a thousand tastes."

• Seymour Papert in *Mindstorms*



Creating a Simulation

- Computers let us simulate things
 - We do this by creating models of the things we want to simulate
 - We need to define what types of objects we will want in our simulation and what they can do
- Diagram labels: user story, nouns, actions
- Classes define the types and create objects of that type
 - Objects act in the simulation

Running a Simulation

- How many objects does it take to get a person fed at a restaurant?
 - Pick people to be the customer, hostess, waiter, chef, and cashier and have them role play
 - What data does each of these people need to do his or her job?
 - What does each type need to know how to do?
 - What other objects do you talk about?
- How about simulating going to a dentist?
Or to the movies?

Alice – Simulation Environment

- Used to create
 - 3D movies
 - 3D games



We will use Alice to simulate our stories and turn them into movies, games, or both.

Confucius' Wisdom

- “Tell me and I’ll forget.
-
- Show me and I’ll remember.



Involve me and I’ll understand!”

Getting Started

Install Alice

- Download from Internet

Start Alice

- Double Click on Icon (Alice.exe)



Wait for Alice to start

- Can take a few minutes



Turning On Java Syntax

Click in **Edit** -> **Preferences**

Change **display my program** from **Alice Style** to **Java Style in Color**

Quit Alice and start it up again
It will keep this setting until you change it again



Pick a World

Click on the Examples tab

And click on a world to open it

You might need to scroll down to see this world:

snowLove



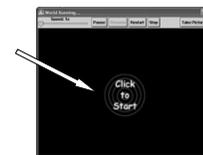
Playing the Movie

To play a saved world
Click the **Play** button

The movie/game will start to play in a separate window

Click on target to play this movie

Most example worlds will just start to play



Create Your Own Movie

Click on **File**
Then **New World**

Click on a template
Background and ground
type



Add Objects To the World

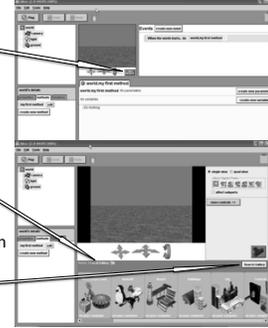
Click the **Add Objects** button

Select a category from the **Local Gallery**

Select **Local Gallery** to get
back from a category

- To the list of categories

Use the **Search Gallery** button
to look for a certain type



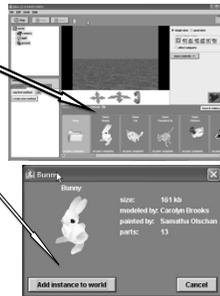
Add Objects to the World

Click on the item to select it

Click on the Class description

Click **Add Instance to world**
Button

Or drag the object from the class
description and drop it into
position in the world



Position an Object in the World

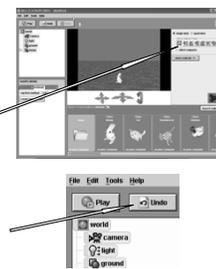
Once the object is in the world

You can move it by

- Dragging it with the mouse

Or using the mouse controls

Click the **Undo** button to undo
the last action



Mouse Controls

- Use mouse control buttons (from left to right)
 - To move object left, right, forward, back
 - Up and down
 - Turn left or right
 - Turn forward or backwards
 - Tumble the object (free rotation)
 - Resize object
 - Copy the object



Create More Objects

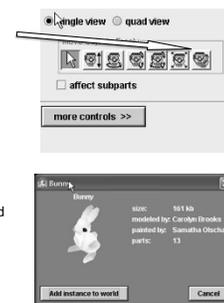
You can use the copy object
mouse control

Or add another instance to the
world

Click on the Class

- Click on the Add instance to world
button

Or drag another object from the
class description



Objects and Classes

You can make many objects of the same class
The class creates the object

The class is a blueprint of the object

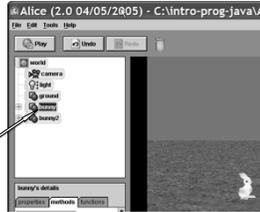
Each object will have a unique name in the object window (reference)

- bunny, bunny2, bunny3

The object is an instance of the class

Class names start with a capital letter

Object names start with a lower case letter

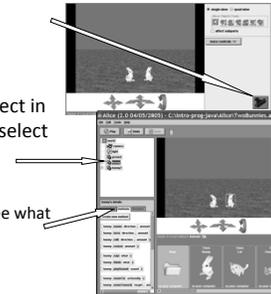


Telling Objects To Do Things

Click the **Done** button to stop adding objects

Click on a reference to an object in the object tree window to select it

Click on the **Methods** tab to see what it can do

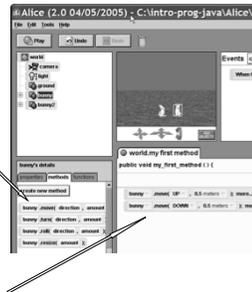


Messages to Objects

In object-oriented programming we send messages to objects

Drag a method from the left to the middle window (world - my first method)

- A green line will show you where it will go



How to Execute my_first_method

Click on the **Play** button

This starts the world

When the World starts it will execute the method:
my_first_method



Method Syntax

Syntax is how statements need to be formed in a programming language

The syntax for a method call on an object is:

`objRef.method(parameterList);`

We call this "dot" notation



Who does the action?

We had selected bunny in the object tree window

- Before we dragged the method
- So the method is invoked on bunny

How do you think we can get bunny2 to do the same action?



Moving Several Objects

To get bunny2 to move

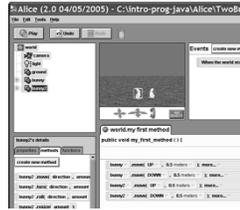
Select bunny2 in the object tree window

- Or just click on it

Then select the method tab

Drag out the same methods for bunny2

Click play to see what happens

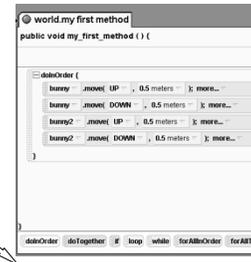


Sequential Execution

By default all Alice methods are executed one after the other

You can specify this explicitly using a **doInOrder** control structure

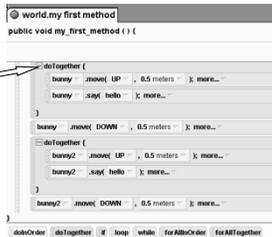
- Drag it from here
- And drag the other statements into it
- What happens when you play it again?



Parallel Execution

What if you want two or more statements to execute at the same time?

- Use a **doTogether**
- Put the things that you want to happen at the same time in the **doTogether** block
- We added methods to make each bunny say hello as it goes up
- What happens if you put a move up and move down in a **doTogether**?



Challenge

- Create a world in Alice with at least two objects of the same class
 - and at least three objects from different classes
- Have each object do some actions
 - Some at the same time
 - Some one after the other (sequential)
- You can use say to have objects “talk” to each other

Creating a Method in Alice

You can create behaviors (methods) in Alice

- Let's teach our bunny how to hop
- Click on bunny in the object tree window
- Then click on the create new method button



Naming the Method

We name methods starting with a lowercase letter

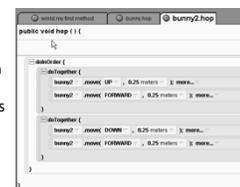
- So name this method hop



Now drag in the commands to make the bunny hop

The bunny should go up and forward and then go down and forward

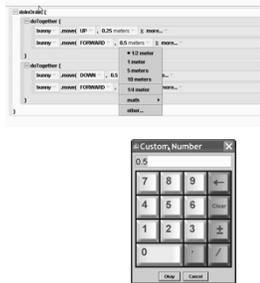
- Use **doTogether** to do two things at the same time
- Use **doInOrder** to do things one after the other



Changing the Amount

You can change the amount to go forward by

- Click on the downward arrow next to the current amount
- Pick one of the values or use other to enter a number



Try Out the Method

Click on the tab:

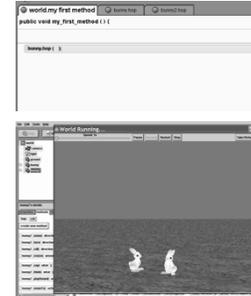
world.my first method

- This is the method that runs when you click on play

Drag in the hop method

Click play to try it

- And see what it does



Having bunny2 hop

If you click on bunny2 it won't have the hop method

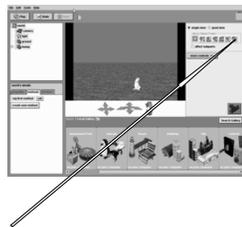
It was created before you added this method to the Bunny class

So delete bunny2

- Click right on it in the object tree and select delete

Click on the add objects button to get the mouse controls back

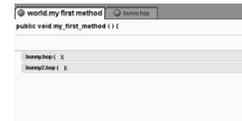
- And make a copy of bunny
- And position it with the mouse controls
- Then click the done button



Adding bunny2 hopping

Click on bunny2 in the objects window

Click the **method** tab



See that bunny2 now has a hop method as well

Drag the hop method to the **world.my first method**
– There is an implicit **doInOrder** around these

Adding parameters to Alice Methods

To add a parameter to a method in Alice
– Click on the **method** tab

Click on the **create new parameter** button

Name the parameter and pick the type

Change the code to use the parameter

- Click down arrow and pick expressions and then the parameter



Trying a Method with a Parameter

Specify the value for the parameter when the method is called

You can't use this new method with bunny2

- Since it was created before you changed the method

So delete bunny2 and create a new copy of bunny



Methods

World methods

- Used for scenes, shots, etc
- Help in segmenting program code for better management and readability

Object methods

- Used for actions that objects can perform, or actions that can be performed on that object



FYI: Object is an instance of a class, so object methods are also known as instance methods

Creating Subclasses in Alice

- When you create a new method in Alice or modify an existing method
 - You are in effect creating a new subclass that has that method or that version of the method

A subclass inherits the fields and methods from the parent class but can add new fields and methods or change inherited ones

- You should name and save this subclass
 - So you can reuse it

Saving a Subclass in Alice

Rename the variable that refers to the object

- Right click on it in the Object tree and select rename

Save the class

- Right click on the object in the Object tree and select save object
 - It will save the class definition which starts with an upper case letter



Use a Subclass in Alice

Select **File** and then **Import**

- And select the class file you created
- This will automatically add an object of the new class to your world

You may need to move the new object to see it



Challenge

- Create a subclass from one of the existing Alice classes
 - With at least two new methods in the subclass
 - Be sure to use the new methods in the movie
 - Have at least two objects of the subclass in the movie
 - Have at least two objects of other classes in the movie

Summary

- You can create objects from classes in Alice
- Each object needs a unique way to refer to it
- You can create new methods
 - Let's you reuse a block of statements
- You can pass parameters to methods
 - To make them more flexible and reusable
- You can create subclasses of other classes
 - They will inherit fields and methods from the parent class