

Alice

The 3D Object-Oriented Programming Environment

Presentation by: Tom Goff



What is Alice?



- Alice is a freely available, innovative way of teaching OOP concepts to students through storytelling.
- The user acts like the director of movie in a 3D world, where all actions are controlled with object-oriented methods.
- The user can make the world interactive, with objects that respond to keyboard input or mouse clicks, or behave according to decision making logic or even randomly.
- The result is like a “visual program”. →



More About Alice

- Created at CMU by team lead by Randy Pausch.
- Written in java, graphics done with Java 3D API.
- Write programs with a “drag-and-drop” interface (you can’t make typos or forget semicolons)
- Lots of resources online to help teachers create courses based on Alice: textbooks, tutorials, teacher workshops, example worlds.
- About 15% of U.S. colleges have courses that integrates Alice into the course material.
- Open source (but you have to buy the textbook).

Who Uses Alice?

- Middle & high school students
- Entry level CS students (no programming experience)
- Experienced CS students



Why Use Alice?

- Introduces programming concepts in a non-technical, and fairly intuitive level. Middle school students know how to tell / direct a story, even if they're not familiar with boolean logic.
- There are VERY basic tutorials that hold the user's hand and walk them through using parts of the Alice IDE.
- Alice has a smooth learning curve, and is used by students ranging from middle school to college level.
- More appealing to female students than traditional CS introduction. (publications and testimonials suggest so)

Know Your Audience...

Notes taken during an observation session of 90 students at a public school in Lynchburg, VA:

“Of the people who reported that ‘Destroy’ was their least favorite part of the experience, 75% of the respondents were female, all of whom mentioned that the destruction sounds were extremely violent sounding, which was made all the more disturbing by the fact that the operation was carried out on a small, pink bunny rabbit.

In reaction to this, I have developed a somewhat friendlier, less chilling destruction protocol that scales objects down to 0.0, makes a whimsical poofing sound and replaces the object with a cloud.

This new protocol has not been tested yet, but I have high hopes that it will be received well by both males and females.”

The Best

▪ Destroying the Bunny	80%
▪ Sounds	30%
▪ Getting Objects to Obey Commands	10%
▪ PointAt	10%

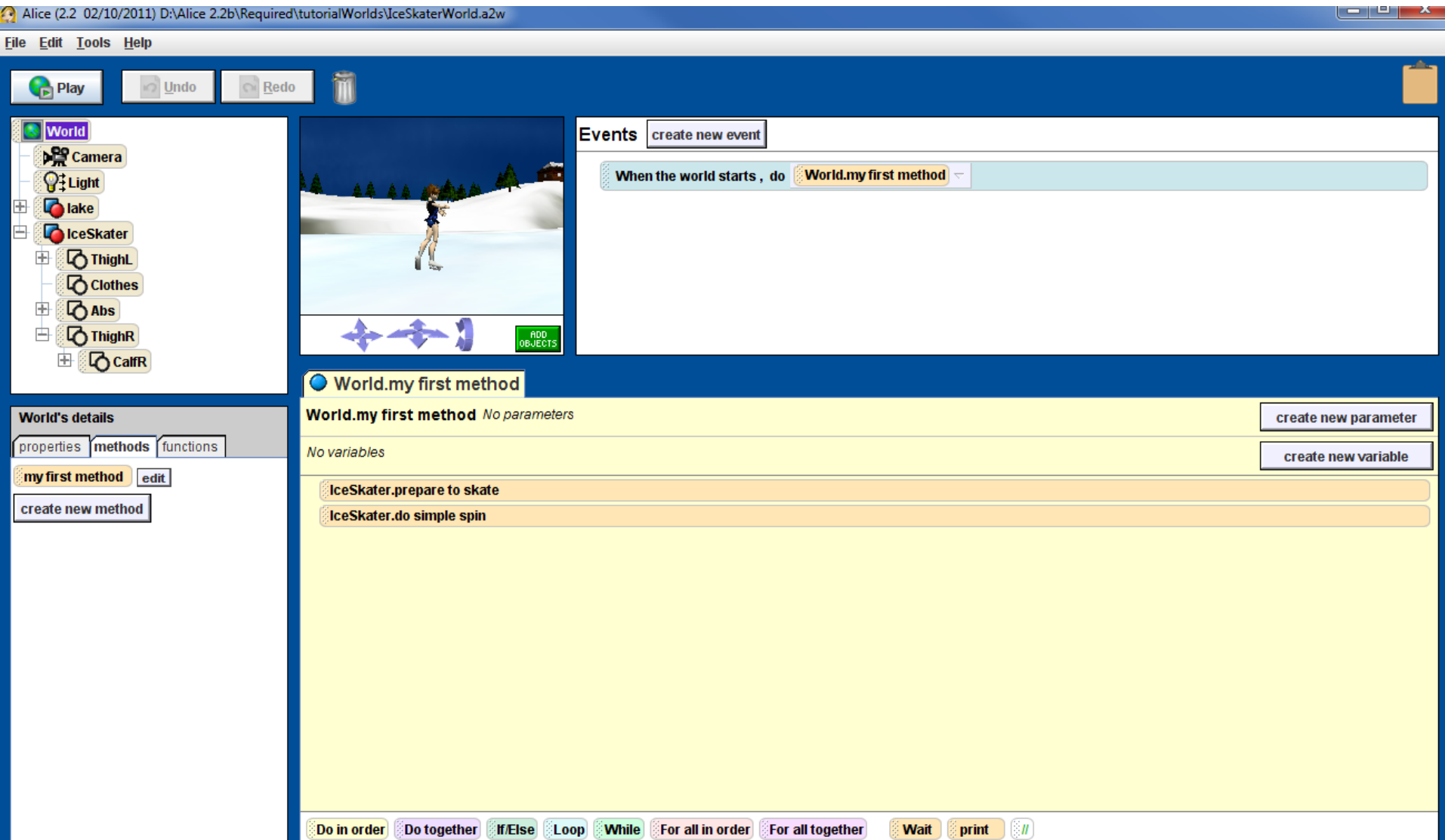
The Worst

▪ Typing	63%
▪ Syntax / Remembering Order of Parameters	45%
▪ Destroying the Bunny	25%
▪ Finding Lost Objects	12%



The Alice IDE

- World Window
- Object Tree
- Object Details area
- Editor area
- Events area



More Detailed Example

The screenshot displays the Alice 2.2 software interface. At the top, the title bar shows the file path: "Alice (2.2 02/10/2011) D:\Alice 2.2\Required\exampleworlds\flightsimulator.azw". The menu bar includes "File", "Edit", "Tools", and "Help". Below the menu bar are buttons for "Play", "Undo", and "Redo".

The main workspace is divided into several panels:

- World Panel (Left):** A list of objects in the world, including Camera, Light, Ground, Biplane, windmill, Gazebo, Helicopter, TallTree, TallTree2, and TallTree3.
- 3D Viewport (Center-Left):** A 3D scene showing a biplane flying over a landscape with a windmill and a gazebo. Text overlays provide instructions: "Mad Props to Brian Stearns...", "arrow keys: turn plane", "left/right/up/down", "space key: barrel roll", and "do all 5 rings -> win a prize". A "Press switch to start ---->>>" button is visible at the bottom of the viewport.
- Events Panel (Right):** A list of events for the selected object. The events are:
 - "When the world starts, do StartScreen set opacity to 0.6 (60%) more..."
 - "When [mouse] is clicked on anything, do World.BeginFlying"
 - "While World.WindMillsOn is true"
 - Begin: Nothing
 - During: windmill.Blades roll at speed left speed = 0.25 revolutions per second more...
 - End: Nothing

The bottom panel shows the detailed view of the selected object, "World.TestForCrash". It has no parameters. The object's properties are:

- BlinkDuration = 0.05

The object's behavior is defined by a script:

- If** Biplane.Propeller distance above Ground < 0
 - Do together**
 - Biplane play sound World.itburns (0:02.257) more...
 - Loop** 5 times times show complicated version
 - World set atmosphereColor to [red] duration = BlinkDuration seconds style = abruptly more...
 - Light set color to [red] duration = BlinkDuration seconds style = abruptly more...
 - World set atmosphereColor to [black] duration = BlinkDuration seconds style = abruptly more...
 - Light set color to [black] duration = BlinkDuration seconds style = abruptly more...
 - Biplane move to <None> offset by = Vector3(0, 0, 0) duration = 0 seconds more...
 - Biplane move up 3 meters duration = 0 seconds more...

At the bottom of the interface, there is a toolbar with various control buttons: "Do in order", "Do together", "If/Else", "Loop", "While", "For all in order", "For all together", "Wait", "print", and a help icon.

Moving Objects in the World

Alice (2.2 02/10/2011) C:\Users\TJ\Desktop\Alice Worlds\moon_mummy.a2w- [Modified]

File Edit Tools Help

Play Undo Redo

world
camera
light
ground
mummy
shark
lunarLander
isis

single view quad view

Tumble Objects

affect subparts

more controls >>

isis's details
properties methods functions
create new variable
capture pose

color =
opacity = 1 (100%)
vehicle = world
skin texture = isis.texture
fillingStyle = solid
pointOfView = position: -1.74, 1.76, 0.78;
isShowing = true

Seldom Used Properties
Sounds
Texture Maps

Home > local Gallery > Egypt

Search Gallery

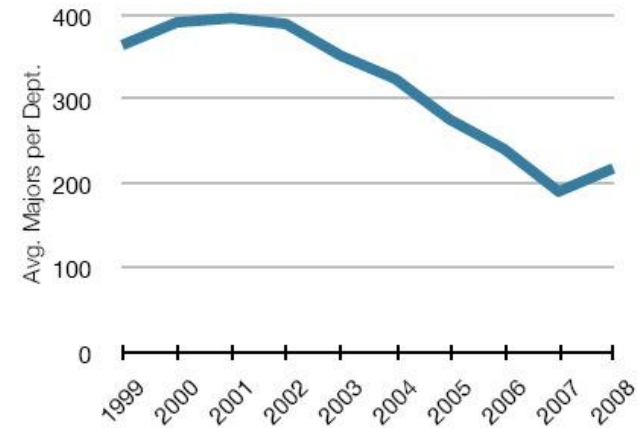
isis

Class Cleopatra on your computer	Class Isis on your computer	Class Mummy on your computer	Class Pharaoh on your computer	Class Pyramid on your computer	Class Ra on your computer	Class Sphinx on your computer
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Alice's Mission

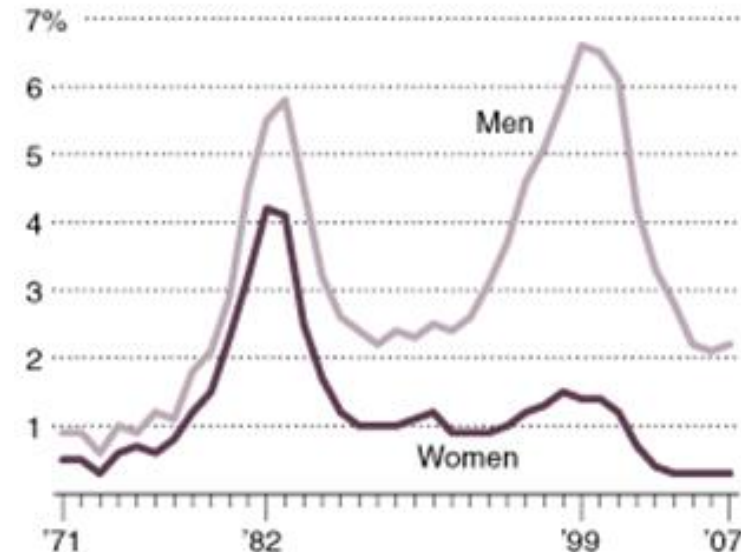
- Get more young people interested in CS.
(visual interface appeals to kids)
- Make CS more appealing to women .
(story-telling vs. programming)
- Increase retention rate of college students entering CS.
("At risk CS1 students average C grade, and 47% take CS2. With Alice, at risk students average B grade, and 88% go on to CS2")

Figure 2. BS Total Enrollment - Avg. Majors per US CS Dept.



Widening Gap

The percentage of female college freshmen who list computer science as a probable major is 0.3 percent, down from 4.2 percent in 1982.



Source: U.C.L.A. Higher Education Research Institute

THE NEW YORK TIMES

Future of Alice

- Alice 3.0 (beta) allows user to manipulate world objects with actual java code.
("They're forced to confront semicolons and braces")
- Better cross platform support.
- CMU is collaborating with Electronic Arts, who agreed to underwrite Alice 3.0



A Work in Progress



Cool features

- Never need to find syntax errors.
- Allows users to progress from simple to advanced concepts such as recursion, although attempting to use recursion brings up an “are you sure?”
- No installation required, and Alice 2.0 fits on a 256MB USB key, so user can easily work with different computers.
- Emphasis on good support materials.

What's Not to Like?

Alice introduces OOP concepts, but isn't a complete OOP language (unless you use java).

- No Inheritance (not really)
- No polymorphism
- Limited by choices offered by IDE (can't directly make a list of lists; only singletons)
- Drag-and-drop paradigm inhibits some tasks (like copy-paste, or deleting *part* of a line)
- Moving the camera in “add-objects” view...

Demo time!

- **1st Demo: Moon-Mummy**
Script using multiple objects and showing some of the things they can do. Shows how objects and instructions are organized.
- **2nd Demo: Whack-a-Mole!**
Interactive game with some more programming elements.

Resources

- <http://www.alice.org/>
- <http://www.alice.org/community/>
- <http://www.aliceprogramming.net/>
- <http://www.java3d.org/>
- http://www.java.com/en/java_in_action/alice.jsp

Storytelling Alice (for middle school)

- <http://www.alice.org/kelleher/storytelling/index.html>