# Programming with Alice

Getting Started with Alice

- Alice is a free programming language
  - Named in honor of Lewis Carroll
  - See web page for download URL
- Different than most languages
  - Visual, focus on 3D animation
  - Same programming concepts as you would find in an object-oriented language but without obscure text commands or the mundane calculations in most intro-level courses
  - You play the role of a director in making a movie
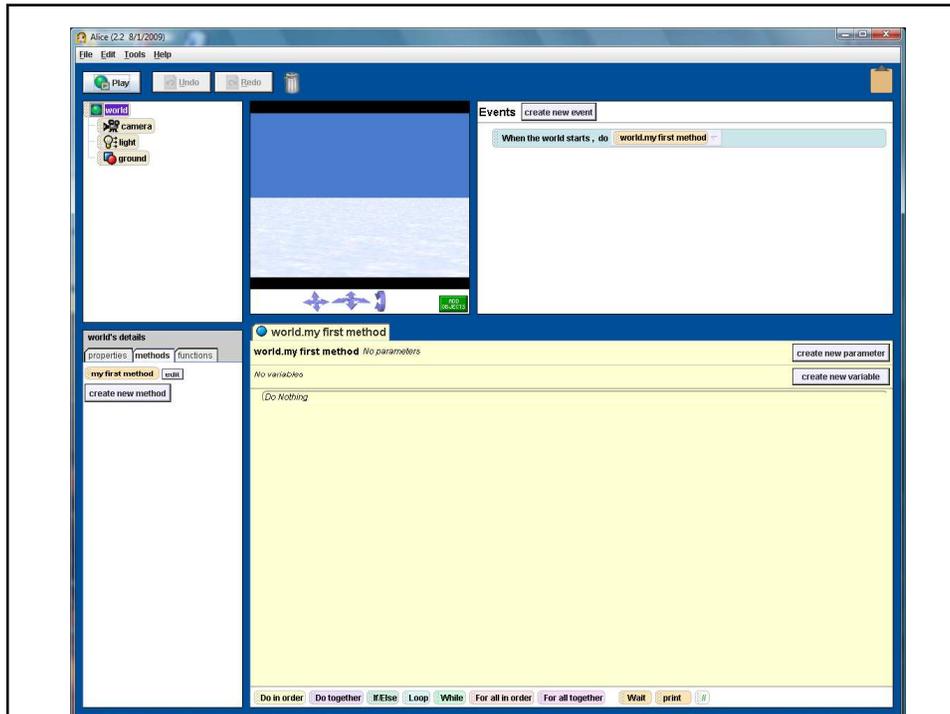
Programming Fundamentals

- List of instructions
  - Sequential processing
- If Statements
  - IF it is raining THEN take an umbrella
  - Conditional execution
- Repeating Behavior
  - WHILE angry (stomp feet)
  - Looping or Iteration
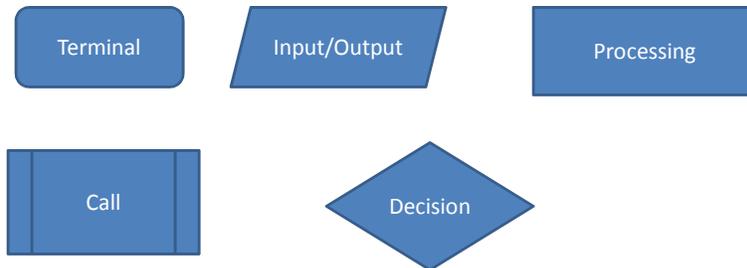
Programming Fundamentals

- Breaking things up into smaller pieces
  - Cleaning house: clean kitchen, clean living room, clean bathroom
    - Each room: pick up toys, vacuum, dust furniture
  - Procedures, Problem Decomposition, Top-down design
- Compute a result
  - Perform sequence of steps to obtain a result that is an answer to a question
  - Determining and implementing an algorithm
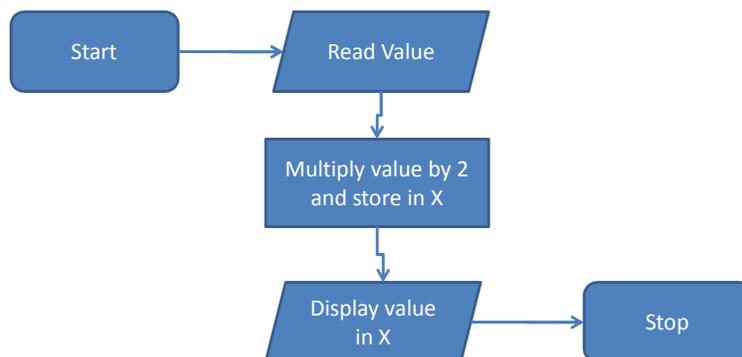
Key to Programming

- Most computers "understand" around 100 instructions; the complexity is in the different orders and combinations
  - Consider chess

- Learning how to think about arranging a sequence of instructions to carry out a task is the most valuable part of learning how to program

Flowcharting

- The book uses some flowchart symbols

Terminal

Input/Output

Processing

Call

Decision

Sample Flowchart

Start → Read Value

Multiply value by 2 and store in X

Display value in X → Stop

Alice Concepts

- In class: Give demo of objects in 3D world

- 3D Virtual World
- Objects in three dimensions
  - Place object with mouse; hold shift to move up/down
  - Objects have properties
  - Height, width, depth in virtual meters
  - Up, Down, Left, Right, Forward, Back all from the perspective of the object
- Objects have center
  - May be center of mass or an end (e.g. bat)
  - Initial placement is usually on the ground
- 2D Graphics
  - Can create a "billboard" from a 2D image

Animation

- Sequence of frames, each with a slightly different scene

- Scene redrawn with objects positioned in a slightly different place

- Alice creates (renders) the sequence of frames for you to make the animation based on instructions you give it

Methods

- Methods are actions with respect to some object
  - It is the group of code, or a procedure, that accomplishes some specific task
- Objects come with a number of built-in actions
  - Can right-click to see methods, or drag a method to the code window

Example

- Add magician, Socrates to the world
- Have each walk forward
- Magician offers to do a trick
- Magician disappears
- Magician reappears in a different place
- Socrates is amazed