

## Interactive Programming

Alice



## Control of flow

- **Control of flow** -- how the sequence of actions in a program is controlled.
  - ✦ What action happens first, what happens next, and then what happens...and so on.
- In movie-style programs (what we've had up till now) the **sequence of actions is determined by the programmer**
  - ✦ Creating a storyboard design
  - ✦ Writing program methods to carry out the designed sequence



## Interactive Animations

- In interactive programs, the **sequence of actions is determined at runtime** when the user provides **input**
  - ✦ clicks the mouse
  - ✦ presses a key on the keyboard
  - ✦ some other source of input
- In essence, **control of flow is now "in the hands of the user!"**

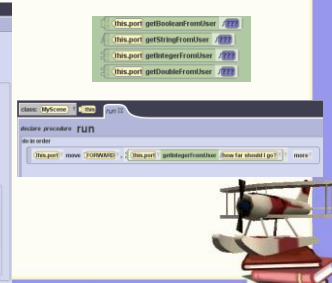


## Types of Alice Programs

### • Movie



### • Interaction



## Events

- Each time the user provides some sort of input, we say an **event** is generated.
  - ✦ An event is "something that happens"



## Alice Events

- When the world starts
- While the world is running
- When a key is typed
- While a key is pressed
- When the mouse is clicked on something
- While the mouse is pressed on something
- While something is true
- When something becomes true
- When a variable changes
- Let the mouse move <object>
- Let the arrow keys move <subject>
- let the mouse move the camera
- Let the mouse orient the camera

6-7



## Event Handling methods

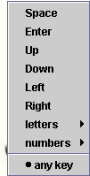
- ④ An event may
  - ✦ Trigger a response, or
  - ✦ Move objects into positions that create some condition (e.g., a collision) that triggers a response.
- ④ A method is called to carry out the response. We call this kind of method an **event handling method**.
- ④ When an event is linked to a method that performs an action, a **behavior** is created.



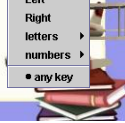
## Handling Key Press and Mouse Events

6.2

- ④ Alice can detect when a key on the keyboard has been pressed
- ④ Key Press Events (such as **when a key is typed**)
  - ✦ The event is triggered when the user types a key
  - ✦ Key that will trigger the event must be specified
  - ✦ **any key** is the placeholder until the "real" key is selected

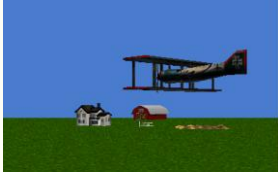


6-9



## Example

- ④ Build an air show flight simulator. In an air show, the pilot uses biplane controls to perform acrobatic stunts.



## Problem

- ④ The whole idea in a flight simulator is to allow the user to control the flight path.
- ④ The problem is: how do we write our program code to provide a guidance system that allows the user to be the pilot?



## Solution

- ④ Use keyboard input
  - ✦ Key to move the biplane forward
  - ✦ Mouse to make the biplane do a barrel turn (Note: other sets of keys could be used, we just arbitrarily picked a couple of keys on the keyboard.)
- ④ Write event handler methods that respond to each key press



## Storyboards

- ④ Since two keys are used, two events are possible – so two storyboards are needed:

<b>Event:</b> <b>Response:</b> <i>Do together</i> roll biplane a full revolution play biplane engine sound	<b>Event::</b> <b>Response:</b> <i>Do together</i> move biplane forward play biplane engine sound
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Each storyboard outlines an event handler that responds to a particular event.



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### Handling the While a key is pressed Event

- The event occurs as long as the user holds down a key
- This tile has four different placeholder slots:
  - any key
  - Begin
  - During
  - End
- Known as **BDE** event

6-14



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### BDE Event

- **Begin**
  - Specifies an action to take place at the beginning
- **During**
  - Specifies an action to take place during the event
- **End**
  - Specifies an action to take place at the end (when the event stops occurring)

6-15



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### Mouse Events / While the mouse is clicked...

- **When the mouse is clicked on something**
- Event is triggered when the mouse is clicked on an object in the world
- **While the mouse is clicked on something**
- Event occurs as long as the user holds down the mouse button while the pointer is positioned over an object

6-16

