Control of Flow

- Control of flow – how the sequence of actions in a program is controlled
  - What action happens first, second, third, ….
- In movie-style programs (Chaps 1-4) 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
- Other sources of input are possible
Interactive Games

• In a video game where the user is guiding a spaceship, the sequence of actions …
  – Depends on what direction the user guides the ship
  – How fast the user presses the controls
• Each time the program runs, user input may cause a different sequence of actions
• Control of flow is “in the hands of the user”

You Already Saw Events

• Each time the user provides some sort of input, an event is generated

![Bee turns around](image)

From Appendix
When spacebar pressed, Bee turns around

Event Handlers

• An event may
  – Trigger a response, or
  – Move objects into positions that create some condition (e.g. a collision) that triggers a response
• An event handler is a method that is called to carry out the response.
• When an event is linked to an event handler, a behavior is created.

How does this effect your program?

• Our goal is to write interactive programs.
• The approach is the same as before, but the difference is now must be concerned with behaviors.
  – input from the user (events)
  – How objects respond to an event (event handler methods)
Example

• Build an air show flight simulator. The pilot (user) uses the biplane controls to perform acrobatic stunts.

• Problem: How do we write program code to provide a guidance system that allows the user to be the pilot?

Solution

• Use keyboard input
  – “F” key to move the biplane forward
  – Spacebar to make the biplane do a barrel roll
  – Note: other keys could be chosen

• Write event handler methods that respond to each key press

• Storyboards (next slide) and DEMO building world

Storyboards

• Since two keys are used, two events are possible – so two storyboards are needed

  Event: Spacebar press
  Response:
  Do together
  roll biplane a full revolution
  play biplane engine sound

  Event: F-key press
  Response:
  Do together
  move biplane forward
  play biplane engine sound

• Each storyboard outlines and event handler
  – Responds to a particular event

biplane.flyForward

• Do not modify the length of the sound
  – use “as is”

• Coordinate duration of move and play sound
  – Match duration of move to duration of sound
Events Editor - Linking

- Each event handler method must be linked to an event

1) Select “create new event”
Then choose the type of event

2) A template linking is created

Events Editor – Linking (cont)

3) Select type of key for event
4) Select event handler method

Final result:

More Functionality

Classwork today

- Create 4 buttons and a spider robot
- Press green button and spider moves forward
- Press red button and spider moves backward
- Other two buttons?