Announcements

• Read Chapter 5 Sec 2 for next Tuesday
• New groups today
• Assignment 5 out
  – Part 1 and Part 2 Due Oct. 24
• Test 1 back today

• Today
  – Interactive programming
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

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

<table>
<thead>
<tr>
<th>Event</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>Spacebar press</td>
<td>Do together&lt;br&gt;roll biplane a full revolution&lt;br&gt;play biplane engine sound</td>
</tr>
<tr>
<td>F-key press</td>
<td>Do together&lt;br&gt;move biplane forward&lt;br&gt;play biplane engine sound</td>
</tr>
</tbody>
</table>

- 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

Events

- When F is typed, do biplane.flyForward
- When Space is typed, do biplane.barrel
- When ↑ is typed, do biplane.flyDirection direction = up
- When ↓ is typed, do biplane.flyDirection direction = down
- When ← is typed, do biplane.flyDirection direction = left
- When → is typed, do biplane.flyDirection direction = right
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?