Announcements

• Read Chapter 5 Sec 2 for next Tuesday
• No Class on Thursday –
  – TA’s will be in D240 9:15-10:15am for checkoffs
  – catch up day, get old work checked off
  – Need to catch up if behind!
• MakeUp Class, Pixar Talk
  – Monday Mar 21, 7:30pm
• New groups today

What we will do today

• Lecture on Chap 5, Sec 1
  – Interactive Programming
• Classwork

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”

Events

• Each time the user provides some sort of input, an event is generated
  – An event is something that happens

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
• A method is called to carry out the response. The type of method is called an event handler.
• 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 uses the biplane controls to perform acrobatic stunts.

Problem

- The idea in a flight simulator  
  - Allow user to control the flight path  
- Problem  
  - How do we write program code to provide a guidance system that allows the user to be the pilot?

Solution

- Use keyboard input  
  - Up-arrow 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**

• 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 roll biplane a full revolution play biplane engine sound</td>
</tr>
<tr>
<td>Up arrow press</td>
<td>Do together move biplane forward play biplane engine sound</td>
</tr>
</tbody>
</table>

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

**Demo**

• A demo of building the biplane simulation
  – flyForward
  – barrel

**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:

Testing

- Test event handler methods as they are developed
- Write a method and test it, write a method and test it, and so on
  – incremental development

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?