Announcements

- Read Chapter 5 Sec 2 for next Tuesday
- New groups today
- Assignment 5 out

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

What we will do today

- Lecture on Chap 5, Sec 1
  - Interactive Programming
- Classwork

Note: thanks to Wanda Dann and Steve Cooper for slide ideas
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

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
• 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: Spacebar press</th>
<th>Event: Up arrow press</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Response:</strong></td>
<td><strong>Response:</strong></td>
</tr>
<tr>
<td>Do together</td>
<td>Do together</td>
</tr>
<tr>
<td>roll biplane a full revolution</td>
<td>move biplane forward</td>
</tr>
<tr>
<td>play biplane engine sound</td>
<td>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

   ![Events Editor](image)

2) A template linking is created

   ![Event Linking](image)

• 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

```javascript
biplane.flyForward
```

```javascript
biplane.flyForward = function() {
  // Simple horizontal move forward
  this.move.x = 2;
  this.duration = 2.4;
  this.style = "abruptly";
}
```
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?