Announcements

• Read Chapter 6 Tips and Techniques for next class
• Reading quiz due next time
• New groups today
• Assignment 5 out
• Today
  – Interactive programming, event handlers
  – Create billboards
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
  – Each time the program runs, user input may cause a different sequence of actions
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?
  – Input from the user (events)
  – How objects respond to events (event handler)
Example 1

- 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

• NOTE Event storyboards are different!
Event Storyboards

- Since two keys are used, two events are possible – so two storyboard scenes

<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>F-key press</td>
<td>Do together, move biplane forward, play biplane engine sound</td>
</tr>
</tbody>
</table>

- Each storyboard outlines an event handler
  - Responds to a particular event
• 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
create new event

- 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`
Add a Billboard with Instructions

- Add an event “I” to make the instructions hide or show (create with paint, powerpoint or some tool and save as an image)
To drop in a Billboard

- “Make Billboard, import, picture appears in object tree
Mouse Clicks

• Interactive programs – allow user to mouse click an object
  – Buttons in an interface
  – Targets in a game
  – Checklist of items on a form

• Will see how to pass information about a mouse clicked object to an event handler
Example 2

- Burning Building
- People are trapped in a burning building
- Select which person will be rescued
- See firetruck.savePerson
Storyboard

• Three people are to be rescued
• Could write 3 different methods

Event: click on guy1
Responding Method: Save guy on first floor

Event: click on girl2
Responding Method: Save girl on second floor

Event: click on girl3
Responding Method: Save girl on third floor
A Better Solution

• Write one event handler
• Send in information needed for action

```javascript
firetruck.savePerson:

parameters: `whichFloor`, `whichPerson`, `howFar`
Do in order
  point ladder at `whichFloor`
  extend ladder `howFar` meters
  `whichPerson` slides down ladder to fire truck
  pull ladder back `howFar` meters
```

What type are the parameters?
Three Events

• The argument sent to parameters depends on which person is mouse clicked

• Note - we positioned fire truck so distance from floor X is X meters (to floor 3 is 3 meters)
Classwork today

• Create 2 worlds (or can combine them in one)
  – Penguins sliding down the hill into the pond.
  – Hockey hitting puck at different speeds (can use any person)
  – Include instructions in both…(make billboard)