Announcements

- Read Chapter 9.1 for next time
- Assignment 6 due Nov 4
- Today
  - Lecture on Chap 7 Sec 2 and Tips and Tech.
    - While loop – indefinite loop
    - Event Loops

Last time - Loop – definite number

- What happens when this code runs?

```java
world.my_first_method() // No parameters

int number = 1;

while (number <= 6) {
    number += 1;
}
```

Repetition

- Sometimes don’t know exactly how many times a set of instructions are repeated.
- Stopping is based on a condition
- Example:
  - Game of Chess, how many moves until win
  - Stop: when markers are in checkmate position
Indefinite Repetition

• In programs where number of repetitions not known in advance, can use
  – While statement

While statement

• While some condition is true
  – execute instructions

Example

• Common feature in popular “action films” is a chase scene
• Example: hungry shark chasing fleeing goldfish
  – Repeat: fish swim away from shark, and shark swim toward fish
  – Shark swim distance a little more than fish swim distance
  – Eventually, shark will catch up with fish and eat fish

Storyboard

While goldfish more than .5 meters from shark
  Do in order
    shark point at goldfish
    Do together
      shark swim (toward goldfish)
      goldfish flee (away from shark)
    shark eat goldfish

shark.Swim, shark.eat and goldfish.flee in book
World.chase

Shark will catch goldfish

- How do you know the shark will eventually catch the goldfish?
  - Shark always moves 0.4 meters towards goldfish
  - Goldfish moves randomly away from shark at most 0.2 meters
  - Shark will eventually catch up, the loop will end

General “Rule of Thumb”

- As a general rule, a While loop should be written so the loop will eventually end
  - Requires statements inside the loop change the conditions of the world such that condition for While eventually becomes false
- If While loop never ends
  - Infinite while loop

Practice – From Bunny eats Broccoli

- Replace with while loop, bunny hops until close to broccoli (< 1 meter)
Using While with Events

- Create new event “while something is true”

<table>
<thead>
<tr>
<th>Event</th>
<th>Action</th>
</tr>
</thead>
<tbody>
<tr>
<td>When a variable changes</td>
<td>do something</td>
</tr>
<tr>
<td>While something is true</td>
<td></td>
</tr>
<tr>
<td>When something is true</td>
<td>do something</td>
</tr>
</tbody>
</table>

- Result

We call this a “BDE”

Example – Penguins meeting

- While 2 penguins are > 3 meters apart
  - Turn to face each other (Begin)
  - Move towards each other repeatedly (During)
  - Bow to each other (End)

Penguins Event Code

- Event – actions occur at different times
- When the event is first true
  - Begin action
- While the event is still true
  - During action repeats
- When the event condition is false
  - End action occurs
Penguin Begin and During parts

- world.PenguinsFaceEachOther: No parameters
  - No variables
  - Do together
    - penguin turn to face penguin2 more...
    - penguin2 turn to face penguin more...

- world.PenguinsMoveForward: 15 distance
  - No variables
  - Do together
    - penguin move forward distance meters more...
    - penguin2 move forward distance meters more...

How do we get this event to happen again?

Another Type of Event – When something is true

- When you want ONE thing to happen when something is true
- Not listed as a new event
- Must create event “while something is true”
- Then “change to” “when something becomes true”
Add in “mama Penguin” (penguin3 resize by 2)

- Control her with arrow keys event

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Penguin3 “take” penquin

- What happens when we move penguin3 over to penguin and then steer penguin3 away?

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```

How do we turn off the move over to penguin2?

- Everytime Penguin3 carries away penguin, penguin wants to move over to penguin2

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- Everytime Penguin3 carries away penguin, penguin wants to move over to penguin2
```
Need another condition

- Can’t turn off the BDE, it kicks in everytime the condition is true
- Must make the BDE condition stronger – AND another condition

What is the difference between?

- While something is true (BDE)
- When something is true

- Add in one more event:
  - Can the “when” event happen again if it becomes true again?

Classwork

- World 1 - Modify game from last time
- World 2 - Start a new world with snow background
  - Add a penguin and a fish resting on the ice
  - Create a BDE that moves the penguin over to the fish and eats it (fish disappears)
  - More with “when event”