Announcements

• Read Chapter 9.1 for next time
• Assignment 6 out, 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?
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 check mate 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

condition true?

no

exit loop

yes

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

World.chase

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

While goldfish distance in front of shark more... > 0.5

Do in order
- shark point at goldfish duration = 0 seconds style = abruptly more...

Do together
- shark.swim
- goldfish.flee

shark.eat what = goldfish
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 .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”

• Result

We call this a "BDE"
BDE – Begin During End

- 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
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

```
When the world starts, do: world.myFirstMethod

While penguin distance to penguin2 > 3
  Begin: world.PenguinsFaceEachOther
  During: world.PenguinsMoveForward distance = 1
  End: world.PenguinsEnding
```
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** 123 distance

No variables

- **Do together**
  - `penguin` move forward `distance` meters more...
  - `penguin2` move forward `distance` meters more...
Penguin End Part

```
world.PenguinsEnding No parameters

No variables

- Do in order
  - Do together
    - penguin turn forward .12 revolutions more...
    - penguin2 turn forward 0.12 revolutions more...
  - Do together
    - penguin turn backward .12 revolutions more...
    - penguin2 turn backward 0.12 revolutions 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
Penguin3 “take” penquin

• What happens when we move penguin3 over to penguin and then steer penguin3 away?
How do we turn off the move over to penguin2?

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

- Can’t turn off the BDE, it kicks in every time 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 with while loop
- 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”