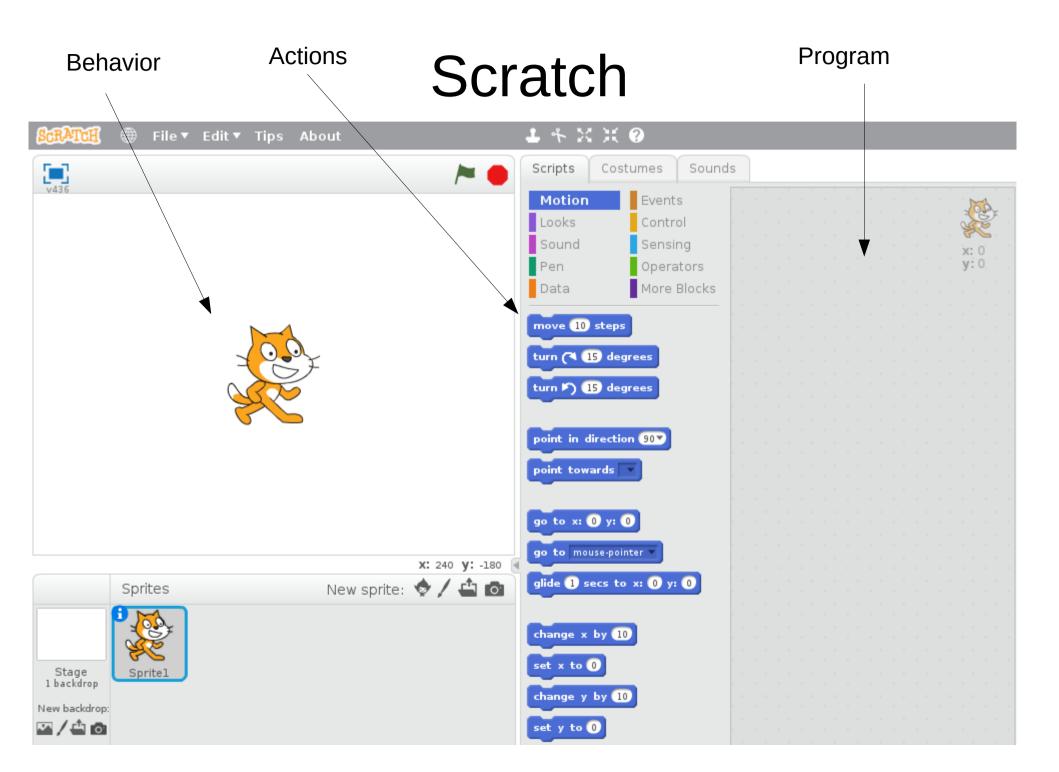
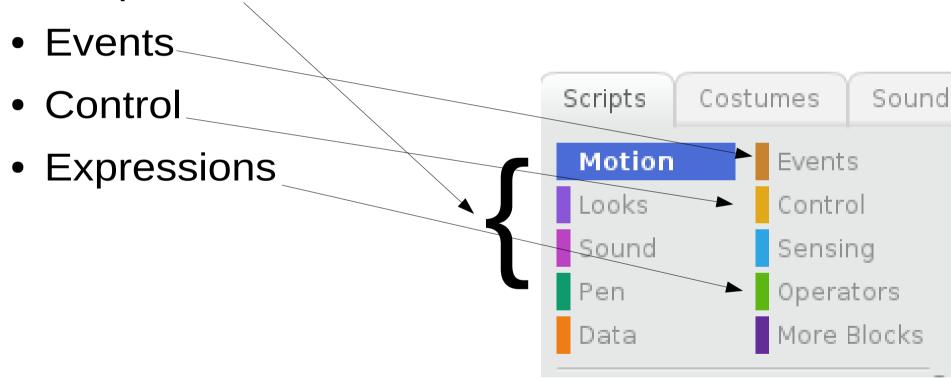
#### Week 1; Lecture 2

Introduction to Programming using Scratch



#### Statements

Simple Statements



#### **Events: Starting Programs**

- Starts programs
- Events are actions that occur outside the program.
  - E.g. Clicking green flag
- Programs can generate events using "broadcast"
  - Broadcast is an asynchronous event
  - Broadcast and wait is a synchronous event

```
when space wey pressed

when this sprite clicked

when backdrop switches to backd

when loudness > 10

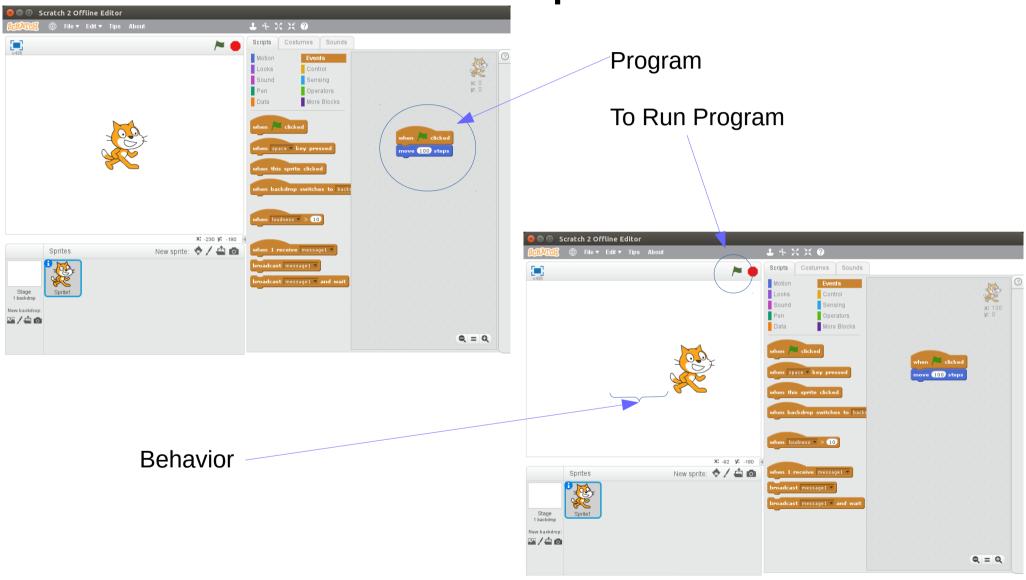
when I receive messagel when broadcast messagel when broadcast messagel when and wait
```

#### Simple Statements: Motion

- Lets you move the sprite
- You can type numbers into the white areas
- You can select from the drop down menus

```
move 10 steps
turn (* 15) degrees
turn 🖍 15 degrees
point in direction 90
point towards
go to x: -182 y: 141
go to mouse-pointer
glide 1) secs to x: -182 y: 141
change x by 10
set x to 0
change y by 10
set y to 0
if on edge, bounce
set rotation style left-right
   x position
   y position
   direction
```

## Example

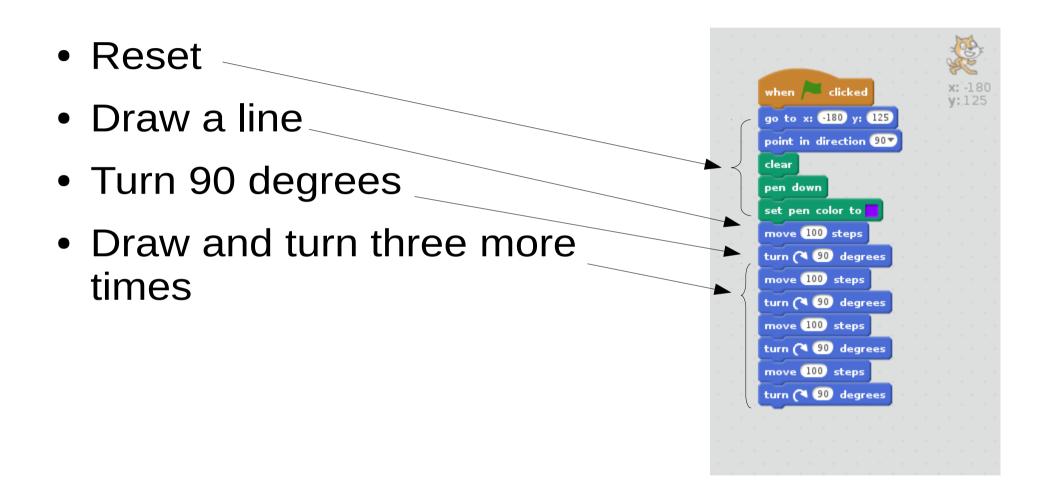


#### Simple Statements: Pen

Lets you play draw on the stage

```
clear
stamp
pen down
pen up
set pen color to
change pen color by 10
set pen color to 0
change pen shade by 10
set pen shade to 50
change pen size by 1
set pen size to 1
```

#### Draw a Square 1



#### Improving the program

- Lines of code a copied
- If possible avoid duplicate lines
  - To change, need to change all.
  - Easy to miss one of the lines.

```
when 🖊 clicked
go to x: (-180) y: (125
point in direction (90 🔻
set pen color to
move (100) steps
turn (4 90) degrees
move 100 steps
turn (4 90 degrees
move 100 steps
turn (4 90 degrees
move (100) steps
turn (3 90) degrees
```

#### Control: Choosing next action

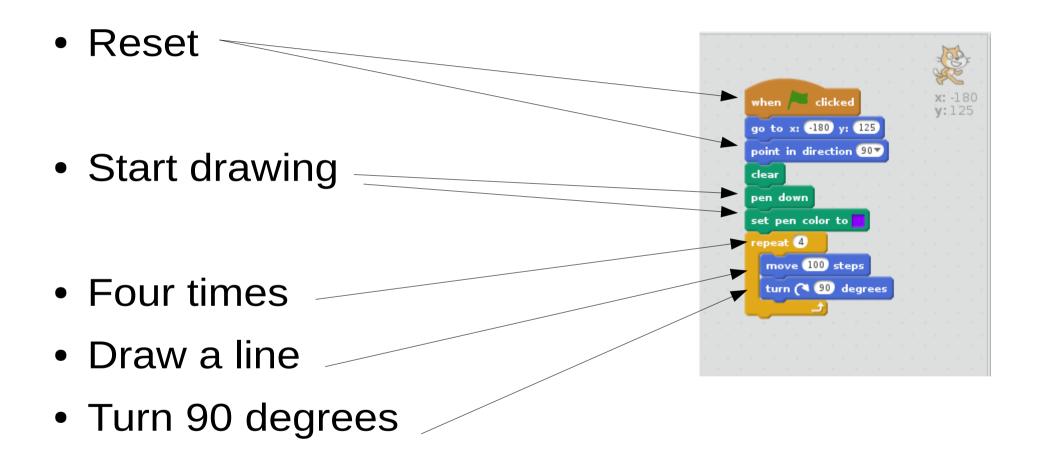
- Selection and Iteration
- Selection (if) chooses between one of two actions
- Iteration (repeat and forever) repeat actions
  - Repeat n times
  - Repeat until

```
wait 1 secs
stop all
 vhen I start as a clone
delete this clone
```

#### Iteration: Repeated Action

Repeat an action several times
Number of time to repeat
Repeat forever
Requires a way to stop the program

#### Draw a Square 2



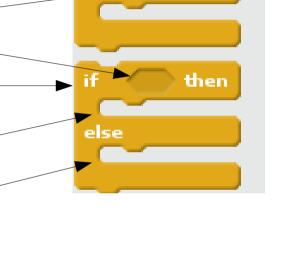
#### Which actions are repeated

- Actions surrounded by the repeat loop are repeated. Here
  - 1. Move 100 steps
  - 2. Turn 90 degrees



#### Selection: Choosing Action

- If test is true do the action
  - When to choose the action -
- If test is true do the action otherwise do the other action
  - If test is true do this
  - If test is false do this



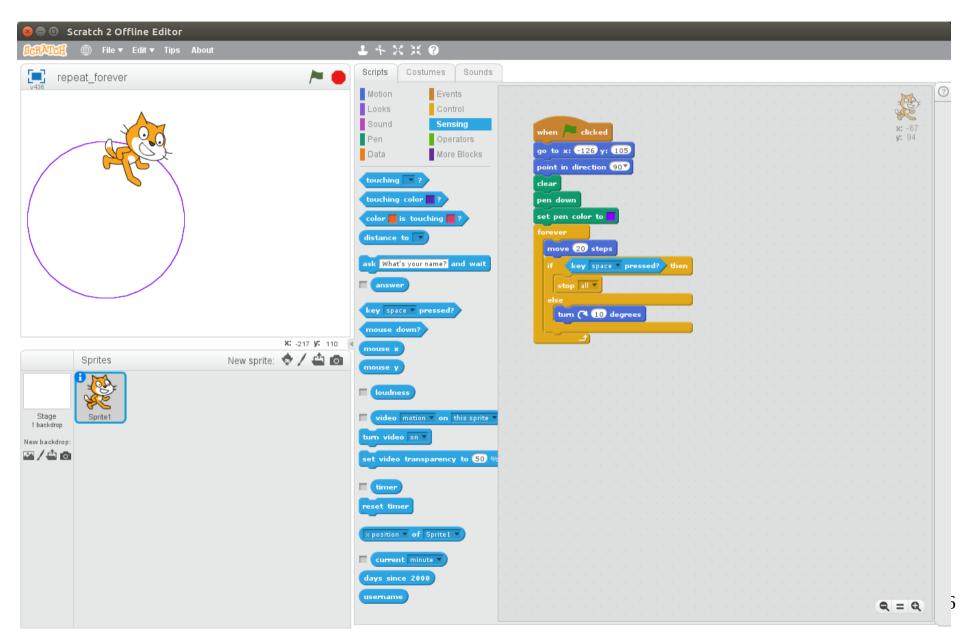
then

## Sensing: Getting input

- Determines state of the program
  - Diamond are tests
  - Ovals are numbers
- Is key pressed
  - True when the key is pressed
- We can quit when the space bar is pressed

```
touching
touching color
distance to
ask What's your name? and wait
 key space pressed?
mouse down?
mouse a
mouse y
  loudness
  video motion ▼ on this sprite
turn video on ▼
set video transparency to (50)
  timer
reset timer
 position of Sprite1
  current minute
days since 2000
username
```

## Repeat until key is pressed



#### Repeat Program

- Repeat forever
  - If the space bar is pressed
    - Stop the program
  - Otherwise
    - Turn 15 degrees

```
when clicked

go to x: -126 y: 105

point in direction 90 clear

pen down

set pen color to

forever

to tve 20 steps

if key space pressed? then

stop all else

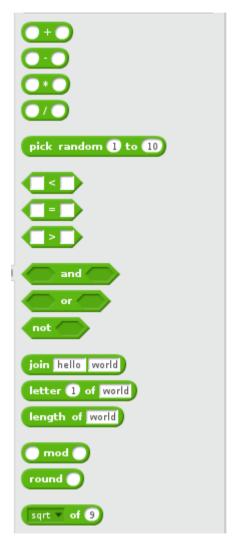
turn (* 10 degrees
```

#### Different description of behavior

 Run until the space bar is pressed

# Expressions: Testing and Calculating

- Perform calculations
- Arithmetic expressions calculate numbers
  - e.g. 1 + 2, 3\* 4
- Boolean expressions evaluate to true or false
  - e.g. 1 < 2, 5 = 6
  - e.g. 1 < 2 or 5 = 6



#### New Program: What does is do?

```
when R clicked
go to x: -126 y: 105
point in direction 90
clear
pen down
set pen color to
turn (< 10 degrees
     key space ▼ pressed? > then
    stop all ▼
    move 20 steps
    turn (15 degrees
     key left arrow ▼ pressed?
    turn (3 90 - 15) degrees
     key right arrow pressed?
    turn 🖹 90 - 15 degrees
```

#### More Statements

#### Sound and Looks

#### Simple Statements: Sound

Lets you play sounds

```
play sound meow
play sound meow v until done
stop all sounds
play drum 1 for 0.25 beats
rest for 0.25 beats
play note 60♥ for 0.5 beats
set instrument to 1
change volume by -10
set volume to 100 %
  volume
change tempo by 20
set tempo to 60 bpm
tempo
```

#### Simple Statements: Looks

 Lets you change the appearance of the stage and the sprite

```
say Hello! for 2 secs
say Hello!
think Hmm... for 2 secs
think Hmm...
show
switch costume to costume2 >
next costume
switch backdrop to backdrop1
change color v effect by 25
set color effect to 0
clear graphic effects
change size by 10
set size to 100 %
go to front
go back 1 layers
   costume #
   backdrop name
```