Create a Simple Game in Scratch

Mike Scott
University of Texas at Austin

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Goals

• Learn about
  - event handling
  - simple sequential execution
  - loops
  - variables
  - conditionals
  - parallel execution
  - message passing
Game Description

• We will make a game where the player controls a baby using the arrow keys to catch a falling ball. If the baby misses the ball the game is over.
Start up Scratch

• Click on Scratch.exe
Delete the Cat

• Click on the scissors and your cursor turns to scissors and then click on the cat to delete it
• Or right click on the cat and pick delete
Add the Baby

- Click on the button with the picture of folder with a star in it
  - if you hover over it, it says "Choose new sprite from file"
Select the People Folder
Scroll to the Baby

- Click on the baby and then OK
Resize Your Sprite!

• You can make your sprite larger or smaller by using the “grow sprite” or “shrink sprite” icons.

• You click on one of these icons, then click on your sprite until it is the size you’d like.
Move the Sprite

- Select (click on the arrow and then on the sprite) and click and drag the sprite to the bottom of the window
Add a Background

• Click on the Stage
  – In the bottom right area
• Click on the Backgrounds tab
  – In the center
• Click on the import button
• Pick a background
  – Like bedroom1 in indoors
Event Handling

• We want to control the baby using the arrow keys
  - When we click the left arrow the baby should move left
  - When we click the right arrow the baby should move right

• This is a form of event handling
  - Responding to user actions like mouse clicks and key presses
The Scratch Stage

- The Scratch stage is 480 pixels wide and 360 pixels high.

Moving left decreases the x value

Moving right increases the x value

at the center of the stage
Programming the Baby

- Click on the baby sprite in the view of the sprites and stage
  - Bottom right section
- Click on the Scripts tab
  - In the center area
  - This allows us to create scripts (programs) for the baby
  - Each sprite can have several scripts
Respond to Arrow Keys

- Click on Control (orange) and then drag out "when space key pressed"
Respond to Right Arrow

- Click on down arrow next to space and select right arrow
- Click on Motion (blue) and drag out "move 10 steps"
Change the move amount

• Click on the 10
  - it will highlight in blue
• Type 5 and press enter
Respond to Arrow Keys

- Click on Control (orange)
- Drag out "when space key pressed"
- Change "space" to "left arrow"
- Click on Motion
- Drag out "move 10 steps"
- Change it to -5 (to move left)
- Click on the stage and try out the left and right arrow keys
  - Does the sprite leave the window?
Paint a Ball

- Click on the paint brush and star
  - It will say "Paint new sprite" if you hover over it
Draw the Ball

- Click the circle tool
  - and then use the eyedropper to pick a color
  - and then click in the drawing area and drag to create the ball

Click ok when done
Size the ball as desired and move it to the top

• Click and drag the ball to the top of the window
Make the Ball Fall

• When the green flag is clicked we want the ball to always start at the top and fall down
  - Click on Control (orange)
  - Drag out "When green flag clicked"
Start the Ball

• Click on Motion (blue)
• Drag out “go to x # y # “
  - this will always start the ball at its current position (Scratch doesn’t automatically put it back for you).
Sequential Execution

- One block is executed after the other
- In order from top to bottom
- When the green flag is clicked
  - the ball will go to the specified x and y location
Loops

• We want the ball to continue to move down unless the baby catches it
• How do we make this happen?
  – We could use lots of blocks one after the other
  – But, that would be slow and repetitive
• We need a way to repeat a block or set of blocks
  – This is called a loop or iteration
Make the ball fall

- **Click on Control (orange)**
  - drag out "forever"
- **Click on Motion (blue)**
  - drag out “change y by 10”
  - Change it to -1
- **Try it out!**
Catch the ball!

- If the ball touches the baby then it is caught
- Let's track how many balls we have caught with a score
  - We will increment the score each time we catch a ball
Variables

• If we are going to keep track of the score
  - We want something to hold the current score
  - And we want to be able to change the score
  - We want the value to change or vary
    • This is called a variable
Track the score

- When we start the game set the score to 0
- Click on Variables (red)
- Click on Make a Variable
- Name it score
Set score to 0

- In the ball script
- Drag the “forever” down
- Drag out "set score to 0"
- Drag the “forever” back up
- Notice the score showing on the window
Conditionals

• We want to increase the score if the baby caught the ball
  - So this action will only occur only if some condition is true
  - This is called a conditional or an “if”
Did we catch the ball?

- From Control drag out an “if”
- Check if the ball is touching the baby
  - Get this in Sensing
- If this is true increment the score
  - From Variables
Increment the score

• Try it out!
  - is this what you expected?

• Computers do what you tell them to
  - Not what you want them to
Reset the Ball

- If we caught the ball
  - Increment the score
  - And move the ball to some random spot at the top of the window
  - So we don’t keep increasing the score
Reset the Ball

- Click on Number
  - drag out "pick random 1 to 10"
  - drop on the x value after “go to x:”
  - change the 1 to -235 and change 10 to 235
  - change the y value to match the y in the first “go to x # y #”
Adding Losing

• If the baby doesn't catch the ball it just gets stuck at the bottom of the screen
• Let's tell the player that he or she lost
Add a text sprite

- Click on the Paint new sprite button
  - Click on the T for text
  - Pick the color
  - Modify the font size
  - Move the square to where you want the text
  - Type You Lost!
Hide the sprite

• We don’t want to tell the player that she lost when the game starts
  - So hide the message when the game starts
• Click on Control
  - drag out "when green flag clicked"
• Click on Looks
  - drag out “hide”
Check if Lost

• If the y position gets near the bottom (near -180)
  - Drag out an if
    • from Control
  - Drag out a blank < blank
    • From Numbers
  - Add a y position
    • From Motion
  - Type in -175
Broadcast a message

- Sprites communicate by passing messages
  - One sprite broadcasts the message
  - Other sprites can listen for it and react to it when they receive it
- Click on Control
  - drag out "broadcast blank"
  - click on the drop down arrow next to new - name it lost
  - Add “stop script”
    - to stop the forever loop
Receive Lost

- Click on the text sprite
- Click on Control
  - drag out "when I receive blank"
  - click on the down arrow and select lost
- Click on Looks
  - drag out “show”
- Click on Control
  - drag out “stop all”
  - to stop all scripts
Parallel Execution

• We have several things happening at the same time
  - when the green flag is clicked

• This is called parallel execution
  - More than one thing happening at a time
Create Instructions

- Click on the Show Project Notes icon in the upper right corner
- Add the instructions
- Press OK
Test your game

• Click the green flag
• If you want, adjust the speed of the ball
  - Increase the amount it changes in y
• Modify the sprites using the “Costume” tab
• Save your game with the “Save” button
Share your game

• You can share your projects at the scratch web site
  - http://scratch.mit.edu
• Click on the Share! button
• You can also download other projects and see how they were created
Other Ideas

• Add a sound when you lose
• Add the ability to win
  - When you reach a certain score
  - Track the amount of time it takes as well
• Speed up the ball over time
• Add more sprites to catch
• Add a sprite to avoid (like a big brother)
  - killer sprite
Concept Summary

• Variables
  - can hold values and can change value
• Forever loops
  - repeat all the commands inside of them one at a time until the script is stopped or all scripts are stopped
• Conditionals – if
  - only execute the body of the if when the condition is true
• Sprites can pass messages
  - and receive them
• Sprites can react to events
  - like clicking the green flag and pressing the left or right arrow keys
• Sprites can have several scripts, costumes, and sounds
• Things can happen one after the other – sequential execution or at the same time – parallel execution