

UNIVERSITY of WISCONSIN-MADISON
Computer Sciences Department

CS 202: Introduction to Computation Professor Andrea Arpaci-Dusseau

How can computation... create animated stories?

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"I'm too tired to listen to a story tonight, mom. Just e-mail something and I'll read it tomorrow."



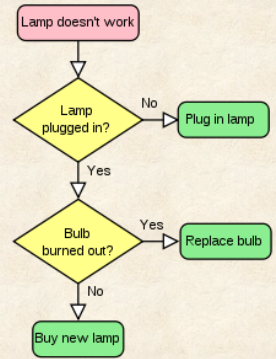
Help Organize Program: Flowcharts

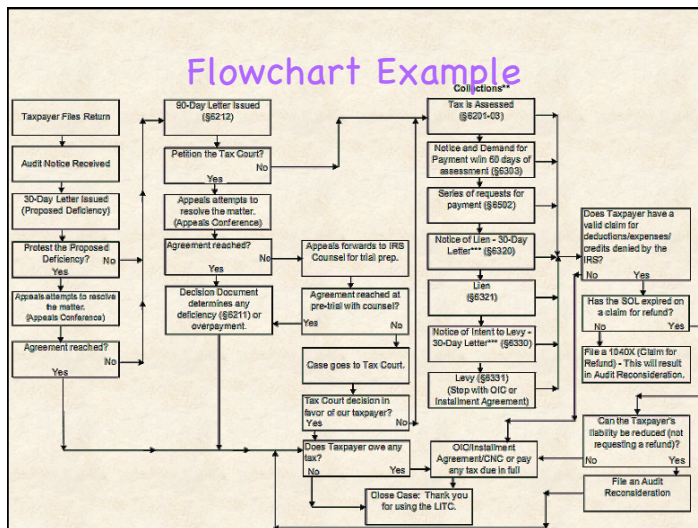
Flowchart:

- Visual representation of steps of algorithm
- Summarizes how algorithm behaves given specific answers

Symbols

- Boxes: Represent states (or actions or actions)
- Arrows (or edges): Show transitions (or decisions) between states





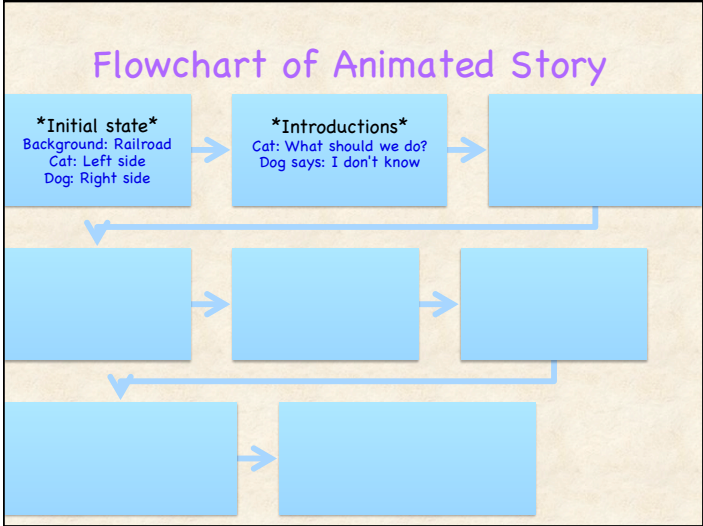
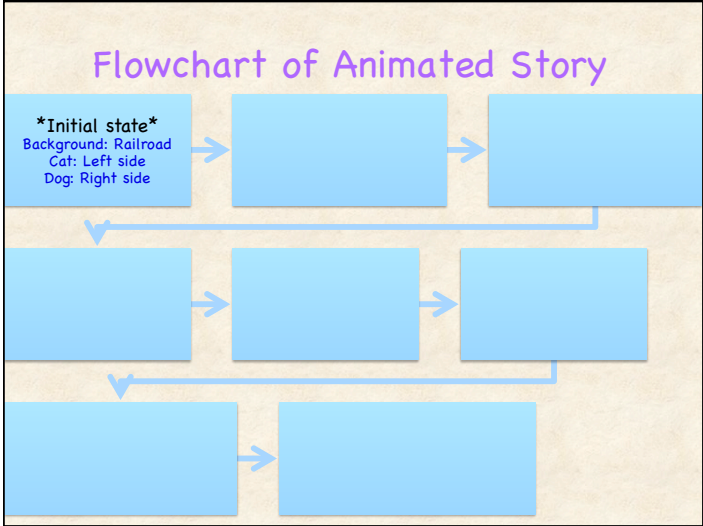
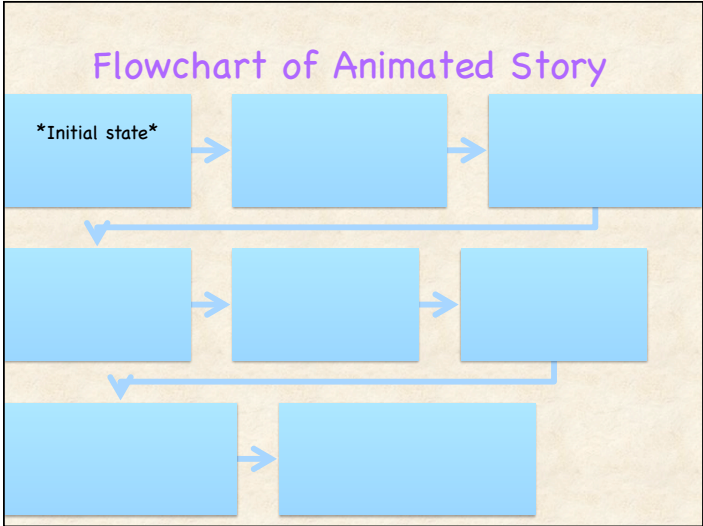
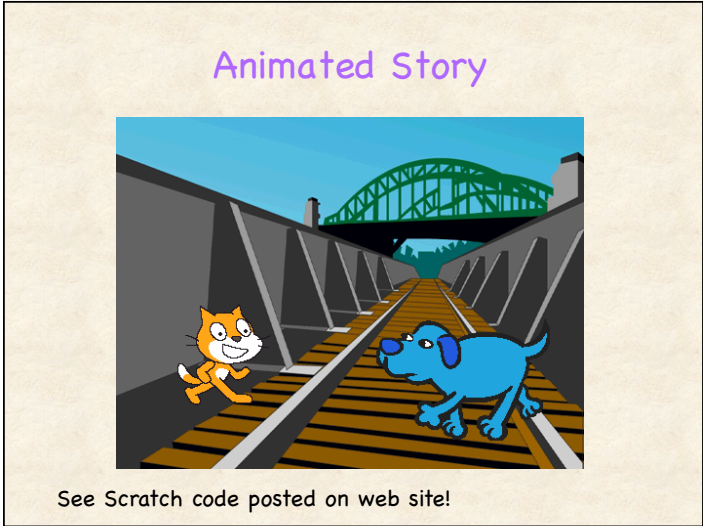
Flowchart for Animated Story

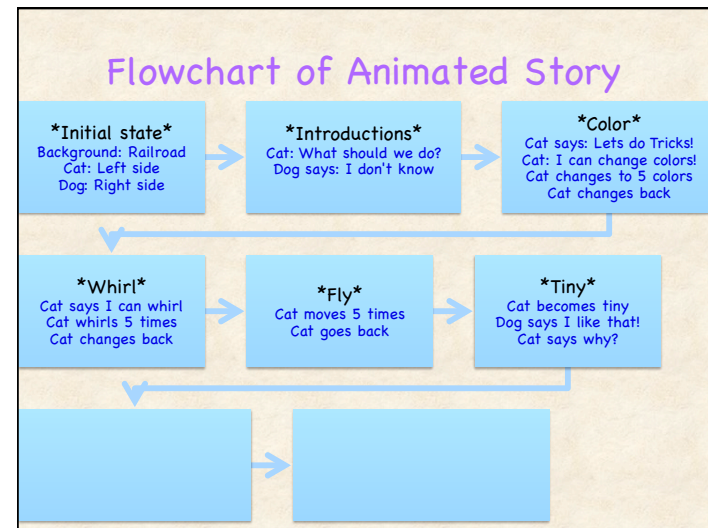
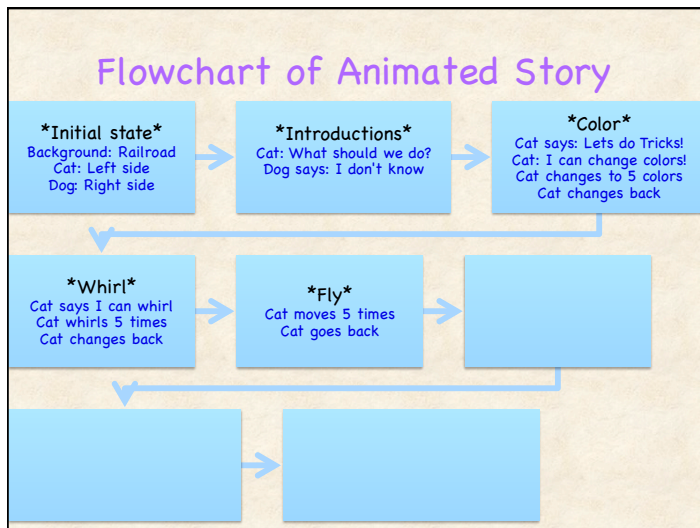
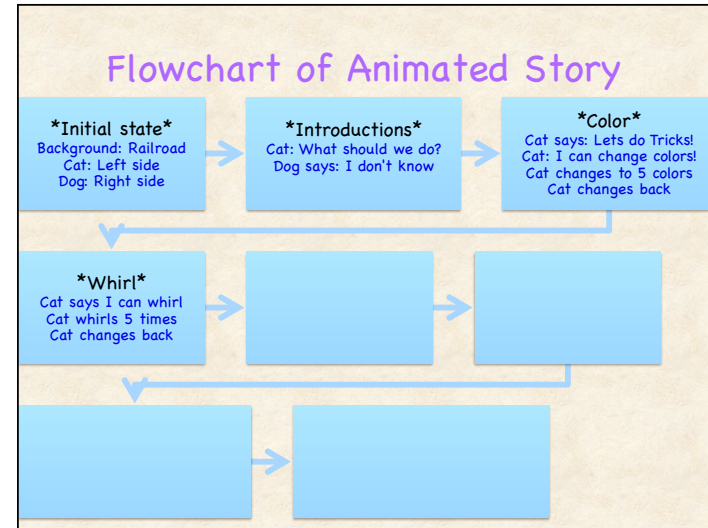
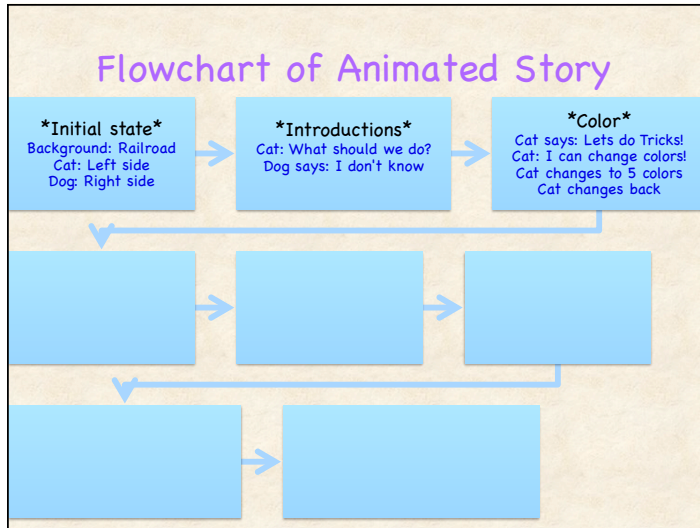
Animated Story: Behaves the same every time

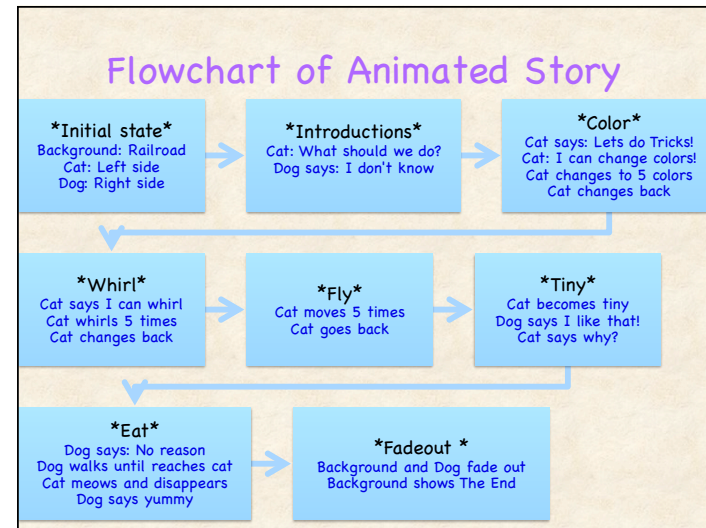
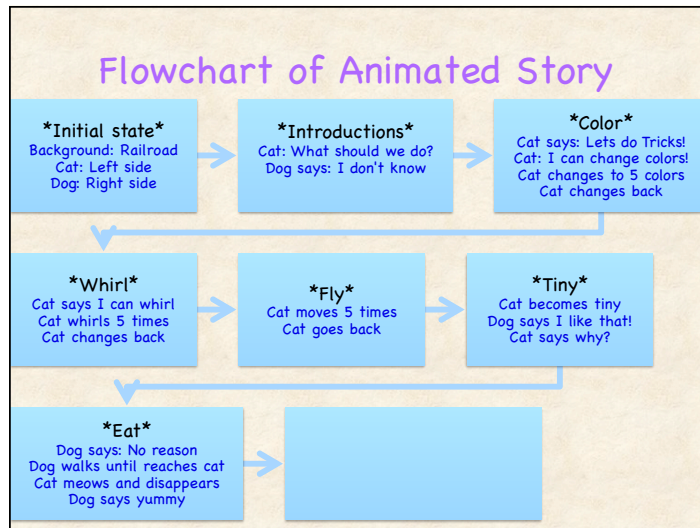
- No decisions!
- Flowchart is summary of action of story

How to create flowchart?

- Identify Initial State or Scene
- Group individual actions into higher-level "scenes"
 - Somewhat subjective (no right answer)
 - Label with descriptive name
- Identify characters of story
 - Specify actions of each character in scene
- Connect scenes sequentially







How to Transform Flowchart to Scripts?

Approach

- For each scene in flowchart, specify a script
 - Blocks in script show individual actions to be performed
 - Specify script for each character that does something

How to determine when script can run?

- When should "Initial state" run?
 - When GreenFlag is Clicked
- When should dog say "I don't know" in "Intro"?
 - After cat says "What should we do today?"
- How will dog know cat has finished saying that???
- Need to coordinate actions ACROSS cat and dog!

How to Tell Another Script to Run?

broadcast sends the message "jump" to all sprites

broadcast sends a message to all the sprites (and the background)

This is useful if you want to tell other sprites when to do something.

What do you want them to do when they receive the message?

See **when I receive**

How to Run Desired Script?

when I receive whenever the message "jump" is broadcast

do this

- change y by 40
- wait 0.5 secs
- change y by -40
- wait 0.5 secs

when I receive jump waits for the message broadcast jump

Wait for Scripts to Complete!

broadcast and wait

send the message "jump" and wait until all the jumps are done then do this

say That was fun!

when I receive jump whenever the message "jump" is sent do this

- change y by 50
- wait 1 secs
- change y by -50

You can use broadcast and wait to send a message to all sprites to tell them to do something, and wait until they all finish before continuing.

broadcast and wait Click to choose which message gets sent.

new Choose "new" to type in your own message.

Beauty of Abstraction

Abstraction: Separation of high-level view of entity from low-level details of implementation

When sender broadcasts "jump", doesn't know how "jump" is implemented by different Sprites

Why is this good?

- Simplifies concerns of sender (don't need to know everything)
- Can change implementation of "jump"

Of course, receiver might not implement "jump"!

Treachery of Images



Naming Convention for Messages

Use good descriptive names

- Purpose of names = help others understand your code
- Suggestion: Name matches name of scene
 - Intro, Color, Whirl, Fly, Tiny, Eat, Fadeout

Problem:

Hard to follow flow of messages across Sprites

Solution:

1. Use Stage to control action as much as possible
2. Use naming convention to help understanding
 - SceneName : Receiver
 - e.g., "Eat : Dog"

Show Code Now

```

when clicked
broadcast Intro:Cat and wait
broadcast Intro:Dog and wait
broadcast Color:Cat and wait
broadcast Whirl:Cat and wait
broadcast Fly:Cat and wait
broadcast Tiny:Cat and wait
broadcast Tiny:Dog and wait
broadcast Tiny:Cat Why? and wait
broadcast Eat:Dog and wait
broadcast Eat:Cat and wait
broadcast Eat: Dog Yummy and wait
broadcast Fadeout
  
```

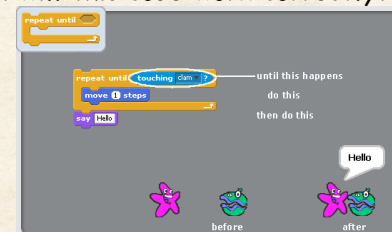
Programming Concepts

General

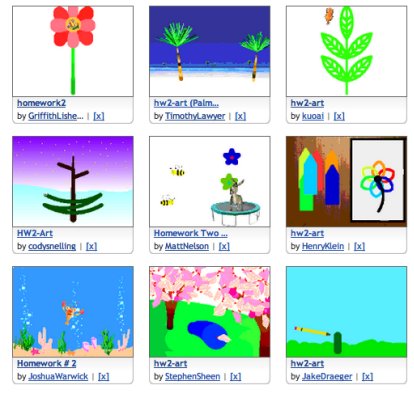
- Divide high-level functionality into logical units
- Descriptive naming is important
- Initial state must be specified
- Incrementally test code as you go
- Scripts must be activated to run
 - When flag clicked; When receive message
- Execution within script proceeds sequentially
- Control : forever, repeat <times>, repeat until
- Parameters (to blocks) specify behavior
- Goal is to make "non-fragile" code

Check-Up

- In your animated story all the scripts are running at the same time. What did you do wrong?
- Can a Sprite receive a message it broadcast?
- When will this code work correctly? when not?



Homework 2: Extra Credit



<http://scratch.mit.edu/galleries/view/176626>