Computational Thinking Concepts

ScratchEd Webinar Series
Monday, March 28, 2011
7pm-8pm EST
Hosted by Karen Brennan
Computational Thinking
Computational thinking is a fundamental skill for everyone, not just for computer scientists.

Wing, Computational thinking
Computational Thinking

Computational concepts (Tonight)
Computational Thinking

Computational concepts (Tonight)
Computational practices (April 25)
Computational Thinking

Computational concepts (Tonight)
Computational practices (April 25)
Computational perspectives (May 23)
Computational Concepts

sequence  conditionals
loops  operators
parallelism  variables
events  lists
Computational Practices

incremental/iterative
testing/debugging
reuse/remix
abstraction/modularization
Computational Perspectives
expressing
connecting
understanding
Computational Concepts

sequence  conditionals
loops operators
parallelism variables
events lists
concept

definition

why it’s useful

showing it in Scratch context

common misconceptions or mix-ups
sequences
identifying a series of steps for a task
- switch to costume: costume2
- next costume
- costume #
- say: "Hello!" for 2 secs
- say: "Hello!
- think: "Mmm..." for 2 secs
- think: "Mmm..."
- change: color by 25
- set: color to 0
- clear graphic effects
- change size by 10
- set size to 100%
- size
- show
- hide
- go to front
- go back 1 layer
loops

running the same sequence multiple times
move 10 steps

wait 0.6 secs

repeat 20

change fish eye effect by pick random 60

wait pick random 0.1 to 0.3 secs

clear graphic effects
parallelism
making things happen at the same time
move 10 steps

turn 15 degrees

turn 15 degrees

point in direction 90°

point towards

go to x: 0 y: 0

go to

glide 1 secs to x: 0 y: 0

change x by 10

set x to 0

change y by 10

set y to 0

if on edge, bounce

x position

y position

direction
When green flag clicked:

- play sound "Scrunch"
- wait 10 secs
- switch to costume "costume1"

When I receive start:

- show
- forever:
  - switch to costume "costume2"
  - play sound "Scrunch"
  - wait 10 secs
  - switch to costume "costume1"
  - wait 10 secs

Ask: What's your name? and wait

- answer

Mouse:

- x
- y
- down?

Key:

- pressed?

Distance:

- to

Reset timer:

- timer

X position of Sprite 1:

- loudness
- loud?
events
one thing causing another thing to happen
forever
  change y by 10
  wait 0.1 secs
  change y by -10
  wait 0.1 secs
say "Hello!" for 2 secs
set color to 0
say "I'm so excited to be here!" for 2 secs
change size by 10
set size to 100%
show
hide
go to front
go back 1 layers
when flag clicked
  go to x: -154 y: -5
glide 1 secs to x: -3 y: 3
  broadcast: appear

say Hello! for 2 secs
say "Hello!
think: "Hmm..." for 2 secs
think: "Hmm...
change: color: effect by 25
set: color: effect to 0
clear graphic effects
change size by 10
set size to 100 %
size
show
hide

go to front

New sprite:
conditionals
making decisions based on conditions
move 10 steps
turn 15 degrees
turn 15 degrees
point in direction 90
point towards
go to x: 0 y: 0
go to
glide 1 secs to x: 0 y: 0
change x by 10
set x to 0
change y by 10
set y to 0
if on edge, bounce
x position
y position
direction
**Scratch Programming Examples**

- **When right arrow key pressed**
  - Move 10 steps

- **When left arrow key pressed**
  - Move -10 steps

- **When clicked**
  - If `x` position > 0
    - Say Right side!
  - Else
    - Say Left side!

- **Change color by** 25
- **Set color to** 0
- **Clear graphic effects**

- **Change size by** 10
- **Set size to** 100 %
- **Size**
- **Show**
- **Hide**
- **Go to front**
- **Go back 1 layers**
operators

support for mathematical and logical expressions
when green flag clicked
forever
  if loud?
    say Lou!
  else
    say Not loud.
move 10 steps
turn 15 degrees
turn -15 degrees
point in direction 90
point towards

go to x: 0 y: 0
go to

glide 1 secs to x: 0 y: 0
change x by 10
set x to 0
change y by 10
set y to 0
if on edge, bounce

new sprite:

x: 252 y: -159
variables

storing, retrieving, and updating data
move 10 steps
turn 15 degrees
turn -15 degrees
point in direction 90°
point towards

go to x: 0 y: 0
go to

glide 2 secs to x: 0 y: 0
change x by 10
set x to 0
change y by 10
set y to 0
if on edge, bounce

x position
y position
direction
lists

structure for organizing a collection of items
Supporting understanding of concepts

- authentically in projects
  
  http://scratch.mit.edu

- studying examples
  
  http://scratch.mit.edu

- debugging
  
  http://scratched.media.mit.edu/resources/debug-it

- challenges
  
  http://scratched.media.mit.edu/resources/short-scratch-programming-challenges

- unplugged activities
  
  http://scratched.media.mit.edu/resources/blocks
Thank You!

http://scratched.media.mit.edu
http://events.scratch.mit.edu

Next webinar: Computational Thinking Practices
Monday, April 25, 2011
7pm-8pm EST