PLTW COMPUTER SCIENCE

Activity 1.1.6

Variable Roles II

Introduction

In a previous activity on the roles of variables, you thought of notes you've made to yourself to help you remember something.

Sometimes we use variables to deal with a collection of information. While we're searching through a collection, we use variables that keep track of what we're looking at and where it belongs in the collection. We also use variables to remember the best item we've found so far or whether we've yet come across a certain kind of item.

Can you think of a time you've rummaged through a collection? How did you keep track of:

- Where you are in the collection
- What you're now looking at
- The best you've seen so far of something
- Whether you've seen a particular item yet

Materials

- Computer with microphone and camera (built-in or external)
- Scratch™ 2 Offline Editor with source files
  - or -
  Scratch account and project links as follows:
  StepperWalker: **http://scratch.mit.edu/projects/22638597/**
  BestSoFar: **http://scratch.mit.edu/projects/22638776/**
  OneWayFlagEVent: **http://scratch.mit.edu/projects/22682705/**
  OneWayFlagProcedural: **http://scratch.mit.edu/projects/22684746/**

Resources

1.1.6 sourceFiles.zip

Procedure

Part I: “Stepper” and “Walker” roles

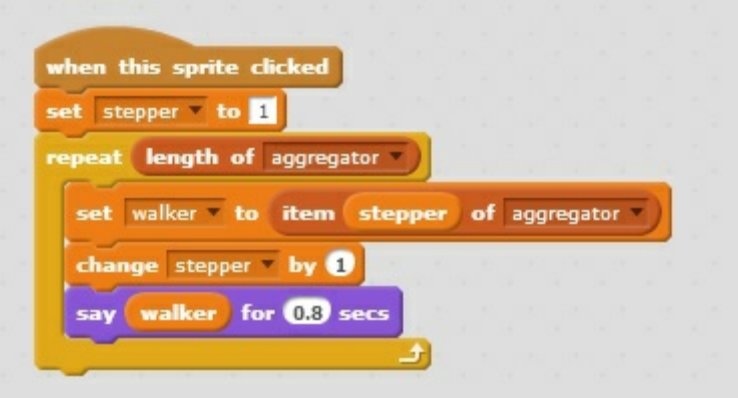
Refer to your downloadable resources for this material. Interactive content may not be available in the PDF edition of this course.

1. Form pairs as directed by your teacher. Meet or greet each other to practice professional skills.

2. Open the Scratch project `1.1.6.a StepperWalker.sb2` in the Scratch 2 Offline Editor or in a browser with http://scratch.mit.edu/projects/22638597/

3. To explore the function of the button labeled **Get Elements**, follow these steps:

    - Run the project by clicking the green flag. Click on the cat several times until five items are aggregated in the list.
    - Click the button labeled **Get Elements**.
    - Notice the numbers that flash in the list. Do they flash in a particular order? Describe the simple pattern you observe.
    - Notice the numbers that the button "says" after it is pushed. Compare these numbers to the items stored in the list. Describe the simple order in which the button is saying the numbers.
    - The script for the button is shown below. What values, one at a time, does `stepper` contain?
    - What values, one at a time, does `walker` contain?



4. Discuss with your partner why the script shown above causes the behavior you observe. Record pseudocode here.

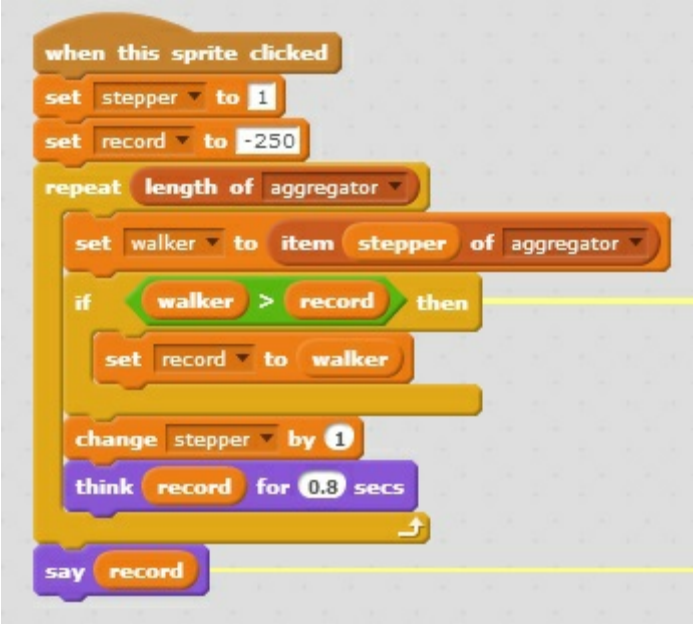
Part II: "Best-so-far" role

5. Open the Scratch project `1.1.6.b BestSoFar.sb2` in the Scratch 2 Offline Editor or in a browser with http://scratch.mit.edu/projects/22638776/

6. To explore the function of the button labeled **Best**, follow these steps:

    - Run the project by clicking the green flag. Click on the cat several times until five items are aggregated in the list.

- Click the button labeled **Best**.
- Notice the numbers that flash in the list. Do they flash in a particular order? Describe the simple pattern you observe.
- Notice the numbers that the **Best** button "thinks" after it is pushed. Compare these numbers to the items stored in the list, and describe the order in which the button is saying the numbers.
- The script for the button is shown below. What values, one at a time, does `record` contain?



- Under what circumstance does `record` change its value during the loop? In other words, explain what has to happen for the conditional `walker > record` to be true?

7. Discuss with your partner why the script shown above causes the behavior you observe. Record pseudocode here.
8. If you stop and start the project over using the stop sign and the green flag, you will be able to clear and refill the list. Describe what you would have to do to make the "Best" button show every value from the list in its think bubble.

Part III: "One-Way Flag" role

A program using a variable for a one-way flag starts with the flag "down" or "0" or "false" and then allows multiple opportunities to "raise" the flag. You will examine two programs that use a one-way flag. In the first program, the program provides multiple opportunities to raise the flag because the user provides multiple events with mouse clicks. In the second program, the multiple opportunities are iterations of a for loop.

9. Open the Scratch project `1.1.6.c OneWayFlagEvent.sb2` in the Scratch 2 Offline Editor or in a browser with **http://scratch.mit.edu/projects/22682705/**
10. Experiment with the program.
    - What makes `flag` become `True`?
    - How can the user make it `False` again?
11. Open the Scratch project `1.1.6.d OneWayFlagProcedural.sb2` in the Scratch 2 Offline Editor or in a browser with **http://scratch.mit.edu/projects/22684746/**
12. Experiment with the program.
    - What makes `flag` become `True`?
    - How can the user make it `False` again?
13. Create your own program that demonstrates a variable fulfilling the role of a one-way flag.
    - What simple task could you accomplish in Scratch that would involve a one-way flag? Brainstorm with your partner, aiming for quantity rather than quality. Write down a tag line for each idea brainstormed.
    - Agree on one idea to develop together. Describe the idea.
    - Plan and strategize how to implement that idea in code and then record your plan in pseudocode.
    - Code and test iteratively, working in parallel with your partner, each person on their own screen. Note that this is not pair programming in which developers work in a driver/navigator pattern.
    - Write a paragraph in which you describe your program. In your description identify the role that each variable in the program fulfills. Explain why you think this role best describes your use of the variable. Submit your program and paragraph as directed by your teacher.

Conclusion

1. Summarize in your own words the role of **Stepper**, **Walker**, and **Best-so-far**.
2. Describe an application you have used that required a variable for the **best-so-far** role.