

Bucket Sort

The interface shows three panels for bucket sorting:

- Evens**: A list of 5 even numbers: 32, 44, 62, 80, 18. Length: 5.
- My List**: An empty list. Length: 0.
- Odds**: A list of 5 odd numbers: 5, 13, 79, 1, 53. Length: 5.

Code It

Bucket Sort uses a bucket sorting algorithm to sort ten pieces of data into two buckets: evens and odds.

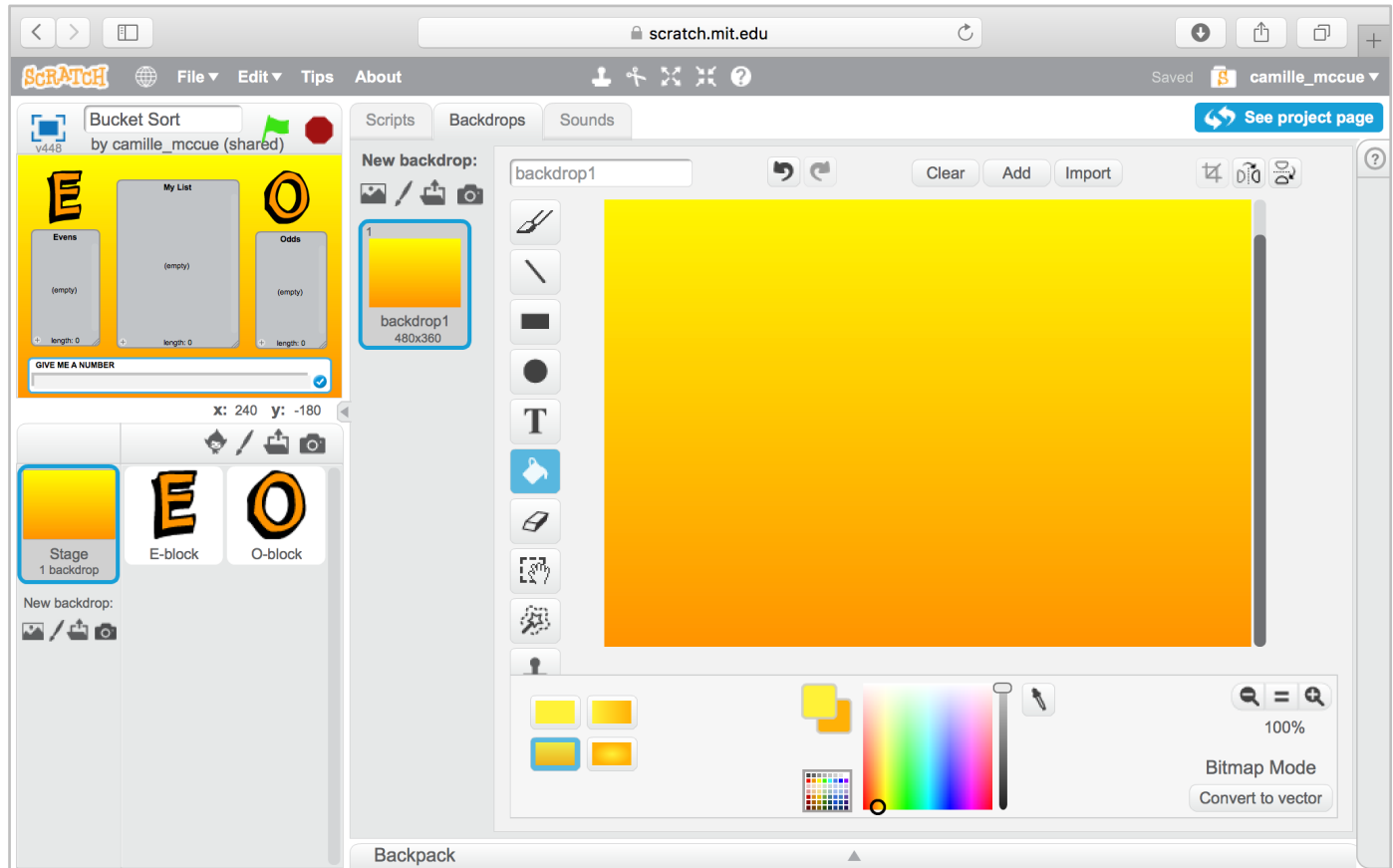
Create a simple background and two sprites, E (for evens) and O (for odds). The sprites serve labelling purposes only, containing no code. In Data, create three lists: My List, Evens, and Odds.

Write a green flag script to delete previous items from the lists of Evens and Odds. Then *ask* the user to input, one at a time, 10 numbers. Each answer is added to My List (the unsorted list). Write a sort script, executed by pressing the "s" key, that uses a modulus computation to determine if the first list item is even. If it is, an *if-then-else* conditional adds the list item to the Evens list. Otherwise (else) the list item is added to the Odds list. Then the item is removed from My List. This process is repeated a total of 10 times.

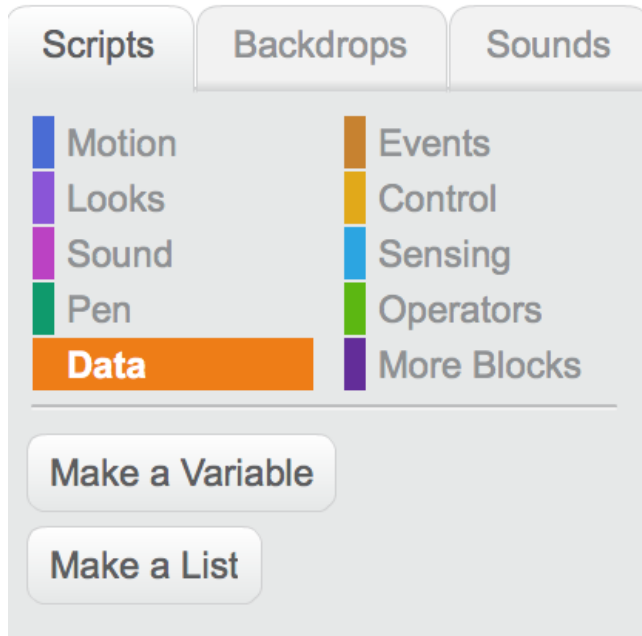
Play It

Press the green flag to start; press "s" to sort.

Stage – Backdrop



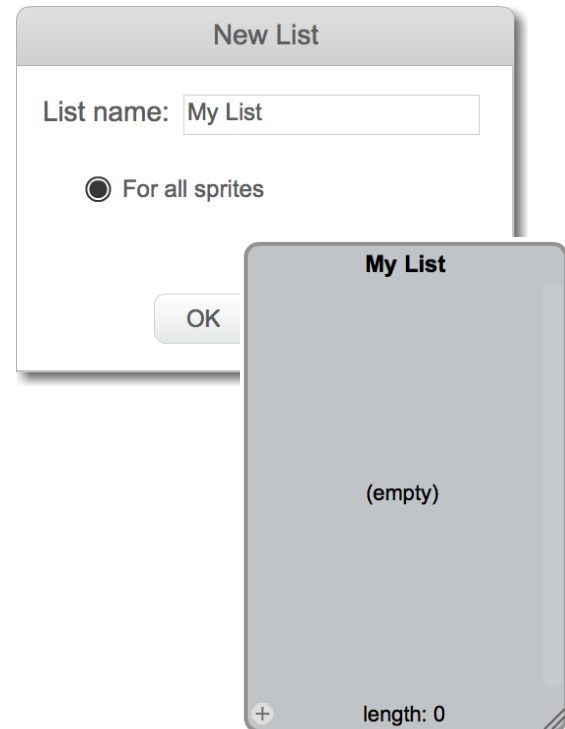
Stage – Lists



The 'Data' menu in Scratch, showing various block categories and options.

- Scripts
- Backdrops
- Sounds
- Motion
- Looks
- Sound
- Pen
- Data**
- Events
- Control
- Sensing
- Operators
- More Blocks

Buttons: Make a Variable, Make a List



New List dialog box showing the list name 'My List' and the option 'For all sprites' selected. The list is empty and has a length of 0.

List name: My List

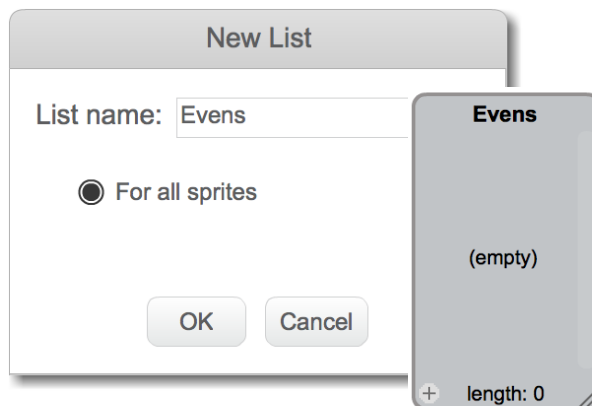
For all sprites

OK

My List

(empty)

length: 0



New List dialog box showing the list name 'Evens' and the option 'For all sprites' selected. The list is empty and has a length of 0.

List name: Evens

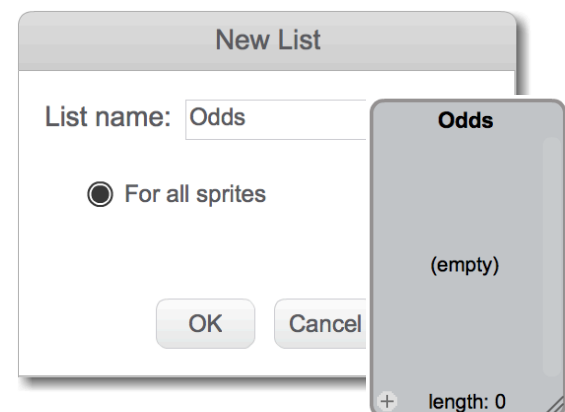
For all sprites

OK Cancel

Evens

(empty)

length: 0



New List dialog box showing the list name 'Odds' and the option 'For all sprites' selected. The list is empty and has a length of 0.

List name: Odds

For all sprites

OK Cancel

Odds

(empty)

length: 0

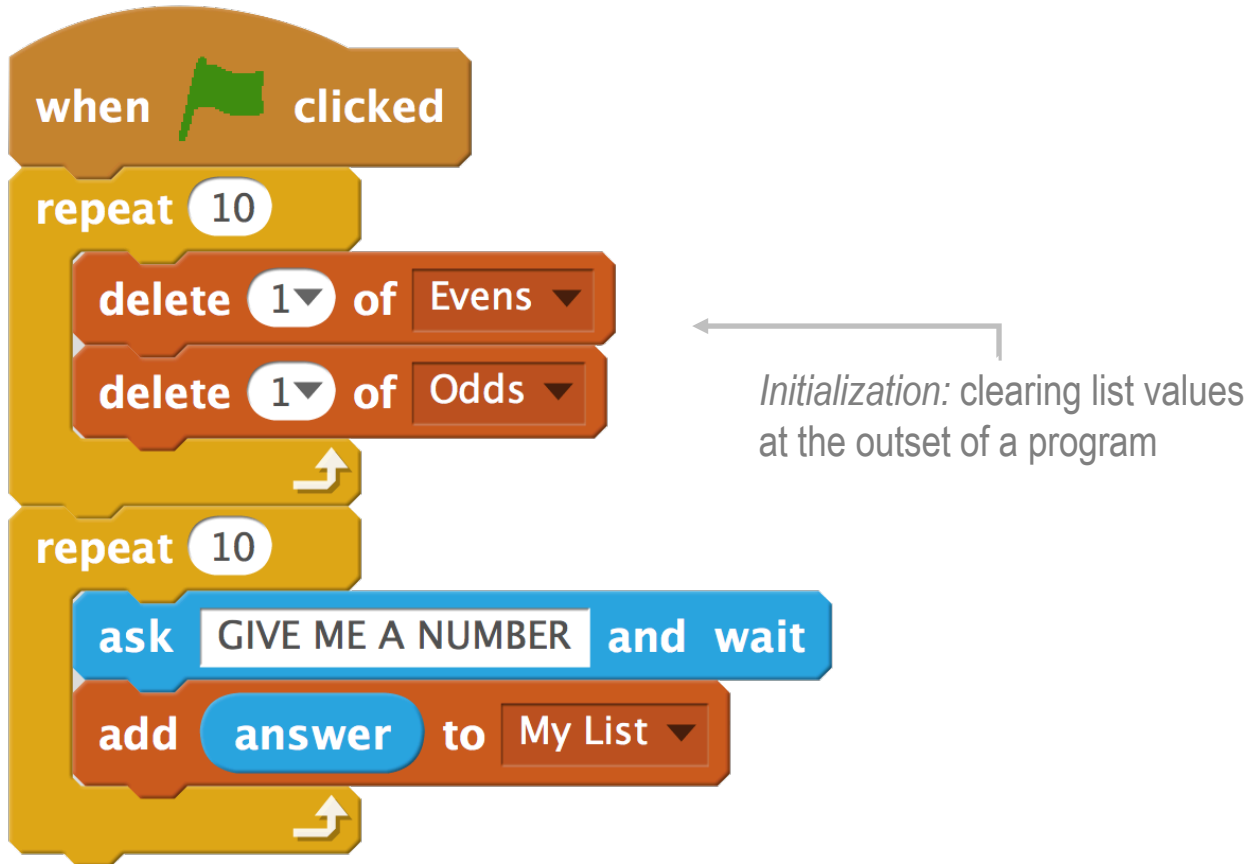
Stage – Scripts

The screenshot displays the Scratch IDE interface for a project titled "Bucket Sort" by camille_mccue. The main workspace shows a script for a bucket sort algorithm. The script is as follows:

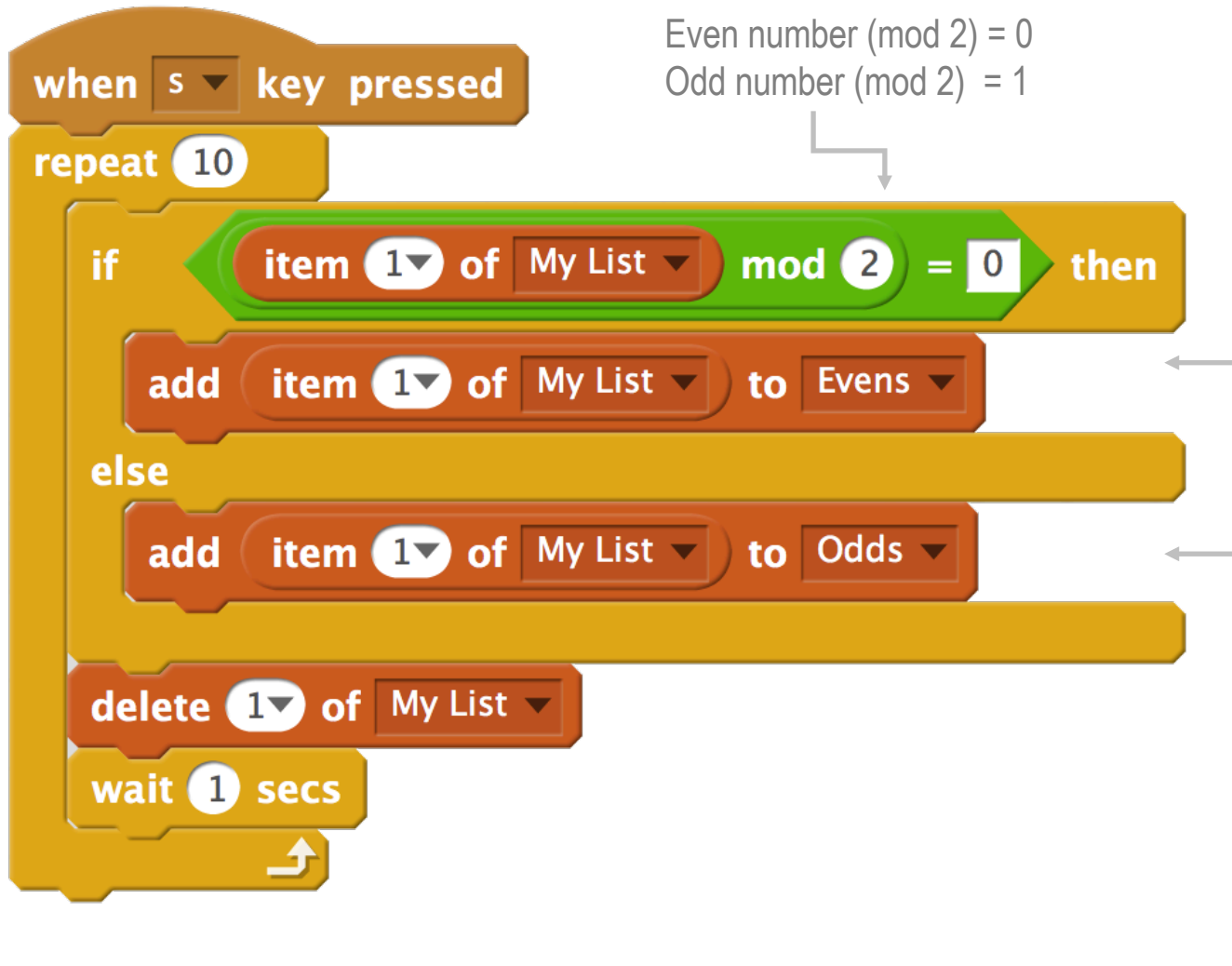
```
when green flag clicked
  repeat 10
    delete 1 of Evens
    delete 1 of Odds
  repeat 10
    ask GIVE ME A NUMBER and wait
    add answer to My List
  repeat 10
    when space key pressed
      repeat 10
        if item 1 of My List mod 2 = 0 then
          add item 1 of My List to Evens
        else
          add item 1 of My List to Odds
        delete 1 of My List
        wait 1 secs
```

The interface includes a top menu bar with "File", "Edit", "Tips", and "About". The left sidebar shows the "Scripts" tab with a list of block categories: Motion, Looks, Sound, Pen, Data, Events, Control, Sensing, Operators, and More Blocks. The "Data" category is selected, showing options to "Make a Variable" and "Make a List". The "My List" variable is visible with a length of 3, containing the numbers 1, 32, and 64. The "Odds" and "Evens" lists are currently empty. The "Scripts" tab is active, showing the script blocks. The "Backpack" tab is also visible at the bottom.

Stage – Script Closeups



Stage – Script Closeups



Mutability: the Evens list and the Odds list are mutable, meaning their lengths can vary; this ability differentiates a list from a 1D array

Extend It

Can you sort the data into other buckets, perhaps based on the attributes of the anticipated data? For example, if the data is student ages, can you sort into two buckets: youth and teens?

Can you think of a way to, through abstraction, make this sorting algorithm more general so that a user can vary the length of My List on every use of the app?