



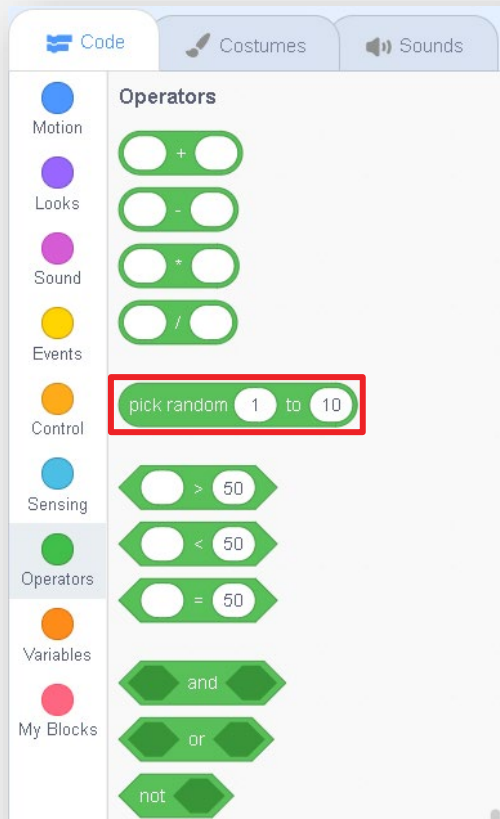
Scratch Programming

Topic 1.10

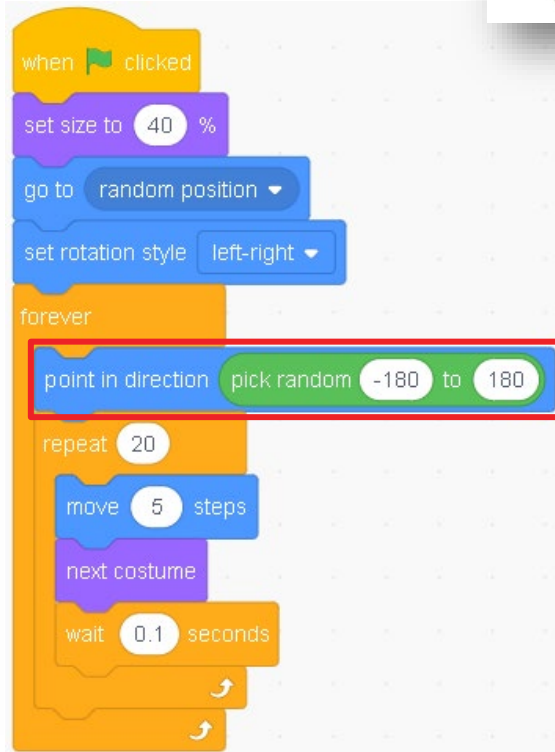
Create Clones

Presented by Advaspire Team

Review Last Topic – Pointing Randomly



Script:



Then we will keep switching Bat's direction when moving around.

So you need to drag a “**point in direction**” block first.

Then we introduce a new block from the operators.

There is one block call “**pick random 1 to 10**”. And you will notice the shape of this block is different than other blocks, it is in ellipse shape.



Review Last Topic – Pick Random Explained



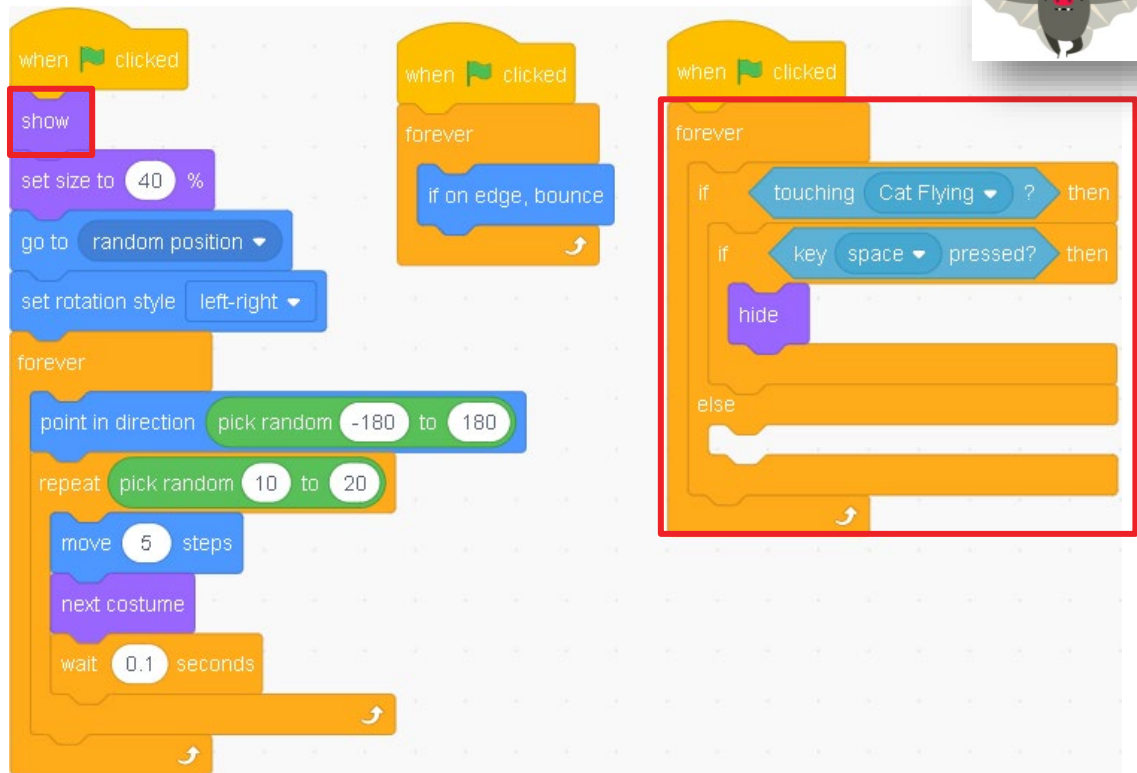
If you put from “-10” to “10”, then the range expands, and there will be a possibility to pick a number of from “-10” to “0” in this case.





Review Last Topic – Bat Program

Script:



And you need a script to make the bat to disappear from the stage when get hit by “Cat Punching”.



Today's Topic

1. Create clones
2. How does creating clones work behind the scene
3. Controlling the number of clones

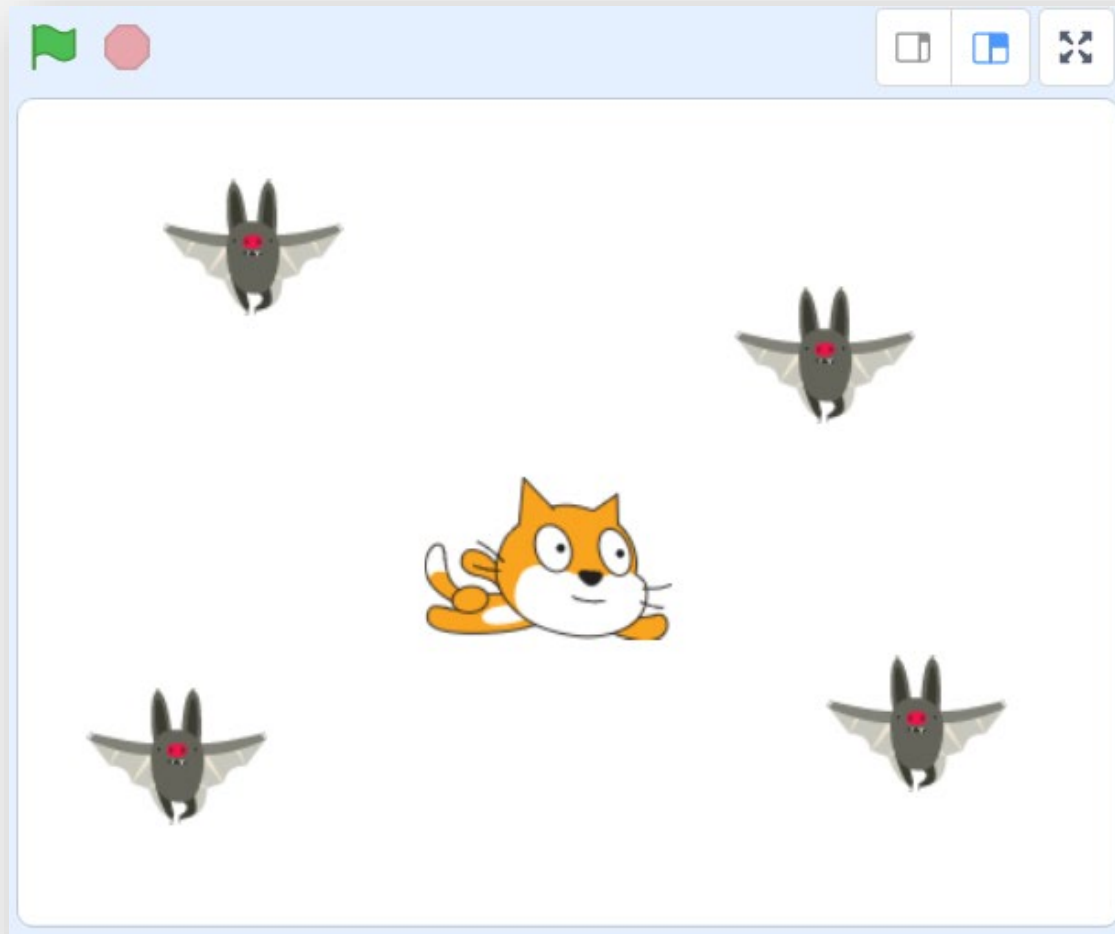


Learning Outcome

1. Able to perform create clones for a sprite
2. Understand how clones work behind the scene
3. Understand the advantage of using clones instead of duplicating sprites
4. Able to use clone method to control spawning units



Mission – Cat Vs Bat



Create a game with title “Cat vs Bat”.

In this game your cat can be controlled by you with arrow buttons (up-down-left-right) and <space> key to change to second costume.

The Bat will move randomly and the cat need to punch and knock out all bats.



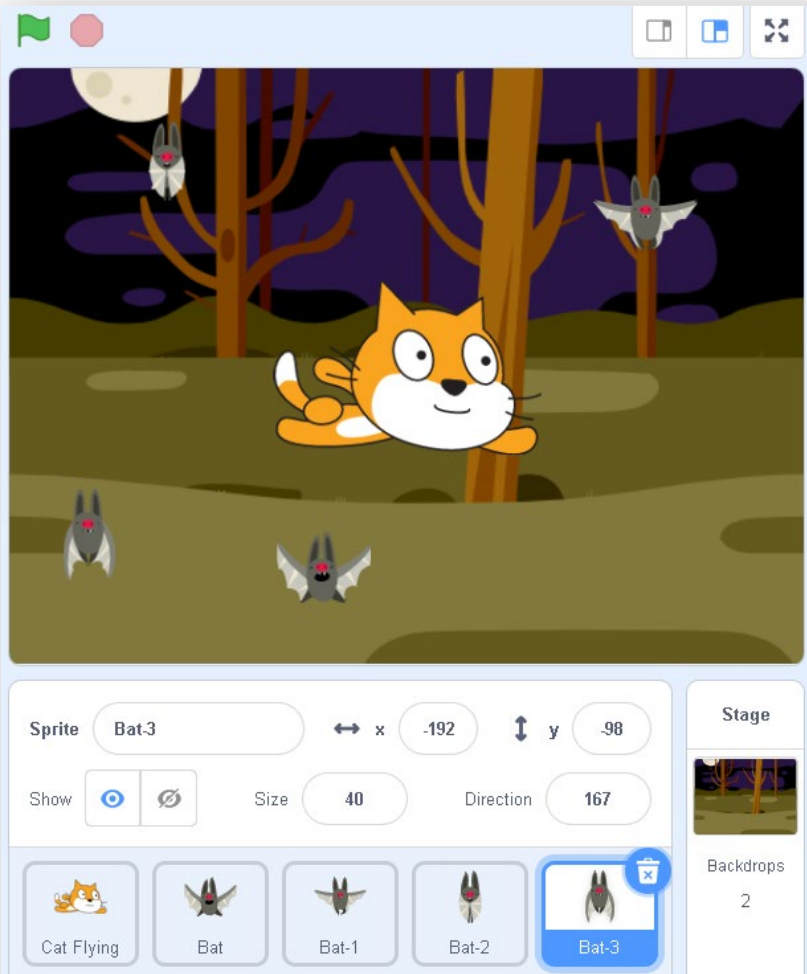
Mission – Cat Vs Bat

Game Rules:

1. You are able to control your cat with up-down-left-right arrow keys
2. Your cat will start at the centre
3. <space> pressed -> Cat Flying (1st costume)
4. <space> not pressed -> Cat Punching (2nd costume)
5. When cat flying to right side -> face right
6. If cat is flying to left -> face left.
7. 6 bats (size = 40%) in the game, spawn randomly and will move randomly
8. When bat gets hit by “Cat Flying”, nothing happen
9. If bat gets hit by “Cat Punching”, disappear from the screen



4. Make multiple bats on the stage

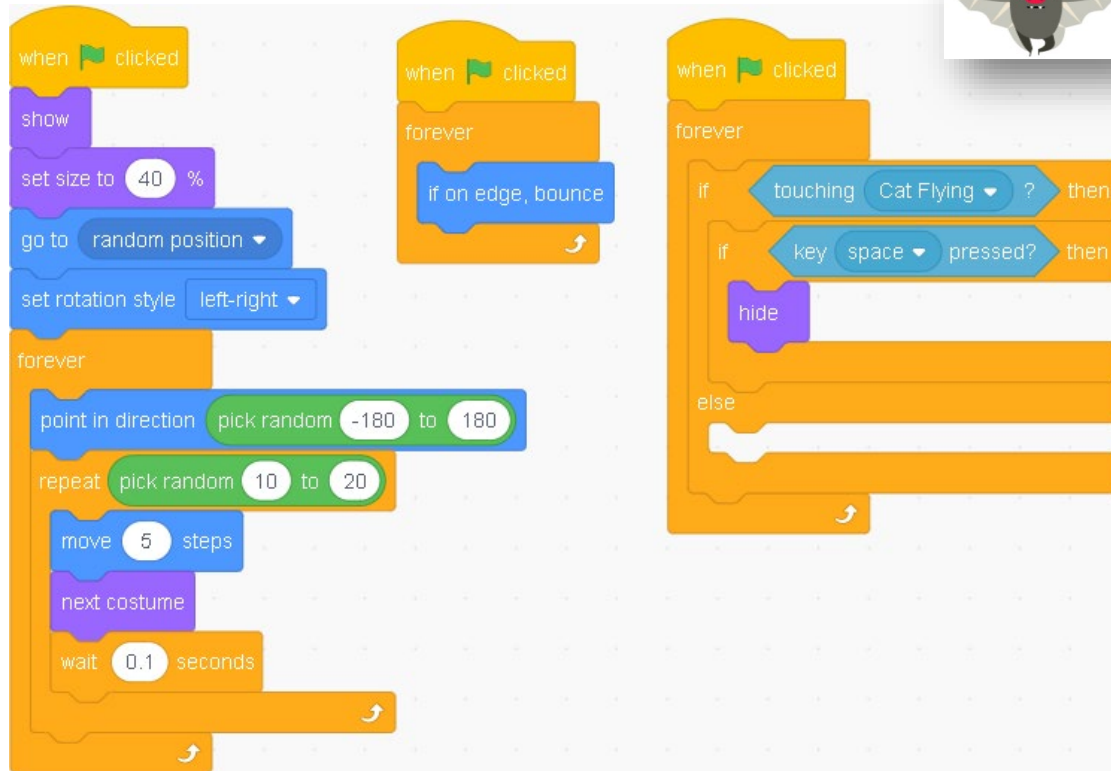


If we want to create few bats on the screen (game rule is to have 6 bats on the stage), normally we will just duplicate the bat to 6 after programming.



4. Make multiple bats on the stage

Script:

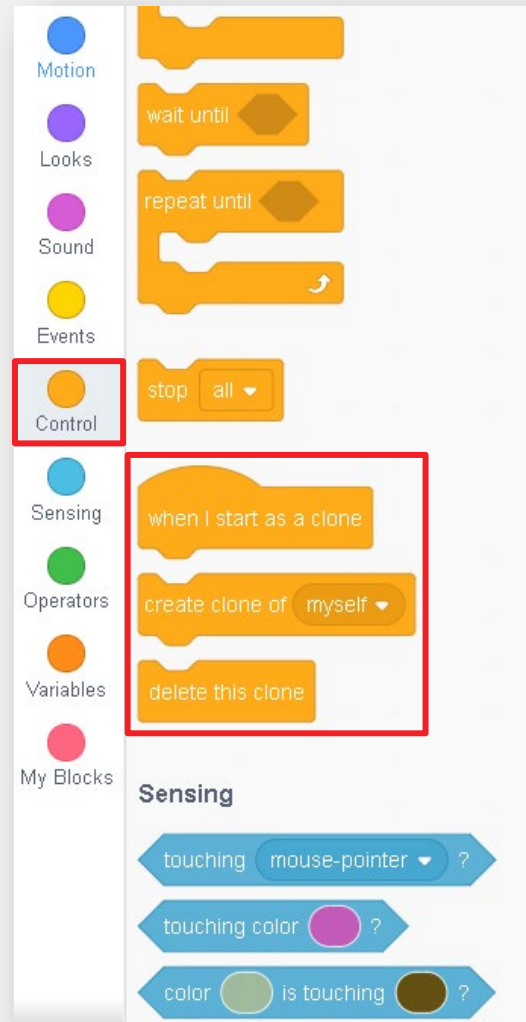


All of our bats are programmed with the same scripts, so that instead of duplicating the bats, we can use create clone to duplicate our bat.

If we use create clone function, then we can easily choose the number of bats we want at different level.



4. Make multiple bats on the stage



Go to the control category, and you will see these 3 blocks which is to create clone, control clone and delete clone.



4. Make multiple bats on the stage

The block palette is shown with the following categories and blocks:

- Motion:** wait until (diamond), repeat until (diamond), go to random position, set rotation style left-right.
- Looks:** stop all.
- Control:** when I start as a clone (highlighted with a red box).
- Sensing:** create clone of myself, delete this clone.
- Operators:** (empty)
- Variables:** (empty)
- My Blocks:** (empty)

Sensing

- touching mouse-pointer ?
- touching color ?
- color is touching ?

Script:

The script area shows three clones of a bat script. Each clone starts with a 'when I start as a clone' block (highlighted with a red box). The first clone has a 'show' block, 'set size to 40 %', 'go to random position', 'set rotation style left-right', and a 'forever' loop containing 'point in direction pick random -180 to 180', 'repeat pick random 10 to 20', 'move 5 steps', 'next costume', and 'wait 0.1 seconds'. The second clone has a 'forever' loop containing 'if on edge, bounce'. The third clone has a 'forever' loop containing 'if touching Cat Flying ? then' and 'if key space pressed? then'.



We change the “**when Flag clicked**” from the scripts of the bat to “**when I start as a clone**”.

This means that the real bat won't have any function, only the clones will do all the functions.



4. Make multiple bats on the stage

The block palette is shown with the following categories and blocks:

- Motion:** wait until, repeat until, stop all.
- Looks:** when I start as a clone, create clone of myself, delete this clone.
- Control:** when I start as a clone, create clone of myself.
- Sensing:** touching mouse-pointer, touching color, color is touching.

Script:

The script area contains the following code:

- when flag clicked:** hide, create clone of myself.
- when I start as a clone:** show, set size to 40%, go to random position, set rotation style left-right, forever loop: point in direction pick random -180 to 180, repeat pick random 10 to 20, move 5 steps, next costume, wait 0.1 seconds.
- when I start as a clone:** forever loop: if on edge, bounce.
- when I start as a clone:** forever loop: if touching Cat Flying? then: if key space pressed? then: hide, else: (empty).



Then we add a start script for the bat, just drag the “**when flag clicked**”, and put a “**hide**” followed by “**create clone of myself**” blocks.



4. Make multiple bats on the stage

Scratch block palette showing the 'Control' category. The 'delete this clone' block is highlighted with a red box. Below the palette, the 'Sensing' category is visible, showing blocks like 'touching mouse-pointer?', 'touching color?', and 'color is touching?'.

Script:

Scratch script for a bat character, featuring a bat icon in the top right corner. The script is organized into four main sections:

- When clicked:** A sequence of blocks: 'hide', 'create clone of myself', and 'when I start as a clone'.
- When I start as a clone (first instance):** A sequence of blocks: 'show', 'set size to 40%', 'go to random position', 'set rotation style left-right', and a 'forever' loop containing:
 - 'point in direction pick random -180 to 180'
 - 'repeat pick random 10 to 20' loop containing:
 - 'move 5 steps'
 - 'next costume'
 - 'wait 0.1 seconds'
- When I start as a clone (second instance):** A 'forever' loop containing the block 'if on edge, bounce'.
- When I start as a clone (third instance):** A 'forever' loop containing:
 - 'if touching Cat Flying?' condition.
 - 'if key space pressed?' condition, which leads to a 'delete this clone' block (highlighted with a red box).
 - 'else' block.

And when the cat punched the bat, the bat will delete its clone instead of just hiding the clone.



4. Make multiple bats on the stage

Script:



The script is divided into three main sections:

- When clicked:** A sequence of four 'create clone of myself' blocks, highlighted with a red box.
- When I start as a clone:** A series of initialization blocks: 'show', 'set size to 40 %', 'go to random position', and 'set rotation style left-right'. This is followed by a 'forever' loop containing: 'point in direction pick random -180 to 180', 'repeat pick random 10 to 20' (containing 'move 5 steps'), 'next costume', and 'wait 0.1 seconds'.
- When I start as a clone (second instance):** A 'forever' loop containing an 'if on edge, bounce' block.
- When I start as a clone (third instance):** A 'forever' loop containing two 'if' conditions: 'if touching Cat Flying ?' and 'if key space pressed?'. Both conditions lead to a 'delete this clone' block.

By using creating clones method to duplicate the bats, the number of sprites can be reduced if you are doing 12 bats on the stage.

4. Make multiple bats on the stage

Script:



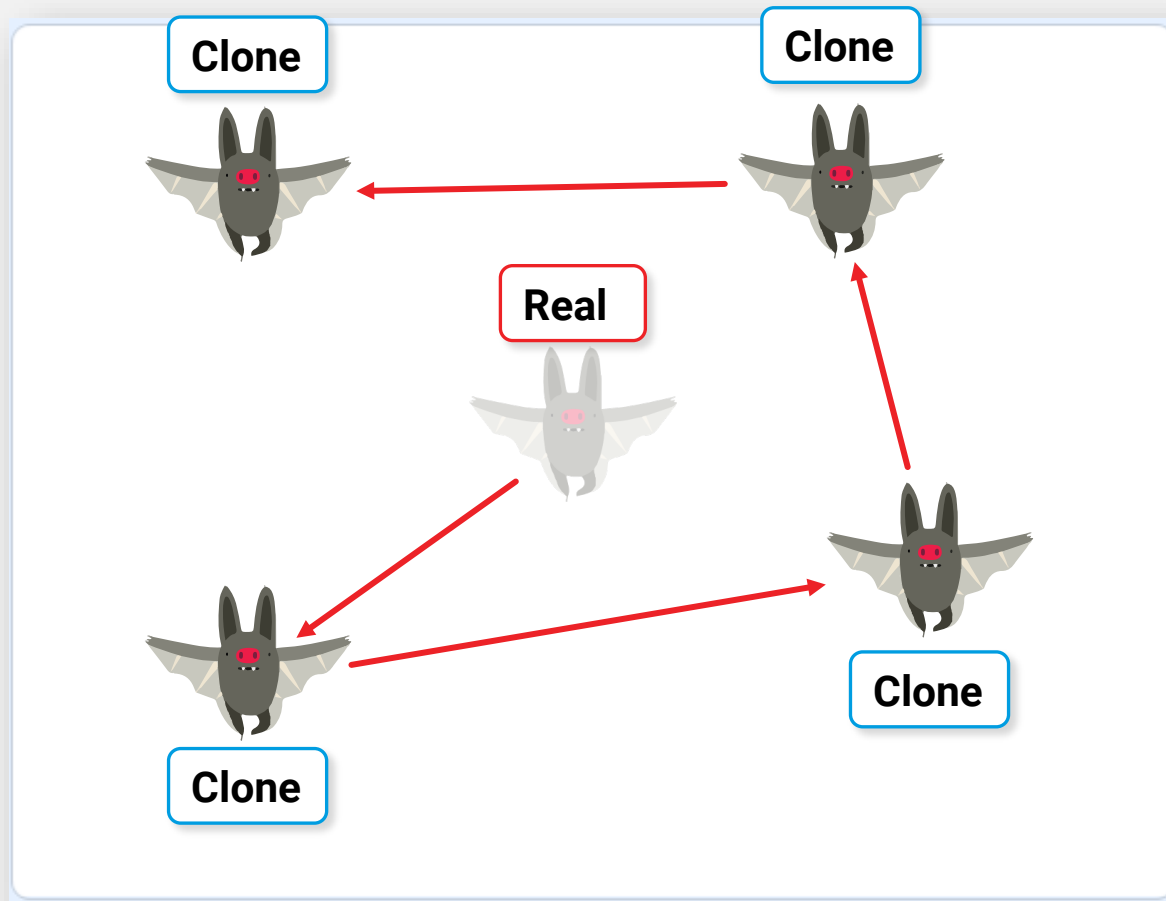
The script is divided into four main sections:

- When clicked:** A 'hide' block followed by a 'repeat' block with a count of 4. Inside the repeat block is a 'create clone of myself' block. This section is highlighted with a red box.
- When I start as a clone:** A 'show' block, 'set size to 40 %', 'go to random position', 'set rotation style left-right', and a 'forever' loop containing:
 - 'point in direction pick random -180 to 180'
 - 'repeat pick random 10 to 20' loop containing:
 - 'move 5 steps'
 - 'next costume'
 - 'wait 0.1 seconds'
- When I start as a clone:** A 'forever' loop containing an 'if on edge, bounce' block.
- When I start as a clone:** A 'forever' loop containing:
 - 'if touching Cat Flying ?' then 'delete this clone'
 - 'if key space pressed?' then 'delete this clone'
 - 'else' block (empty)

To make it simple and easy to change the number of clones to be created, we can put a repeat blocks and just put in how many clones we want on the repeat block.



4. Create Clone explained



The real bat will only create the clones, it won't have other functions.

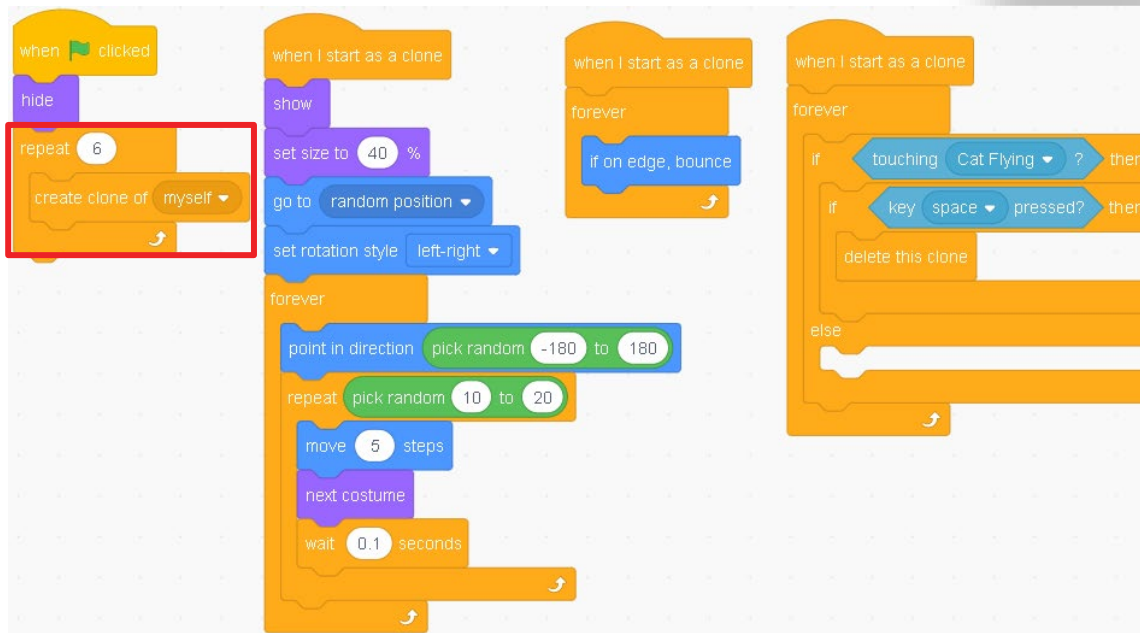
So the real bat will keep creating clones for repeated time (set by you in the repeat block).

And the real bat won't show itself after all, only the clones will show itself after going to random positions.



4. Make multiple bats on the stage

Script:



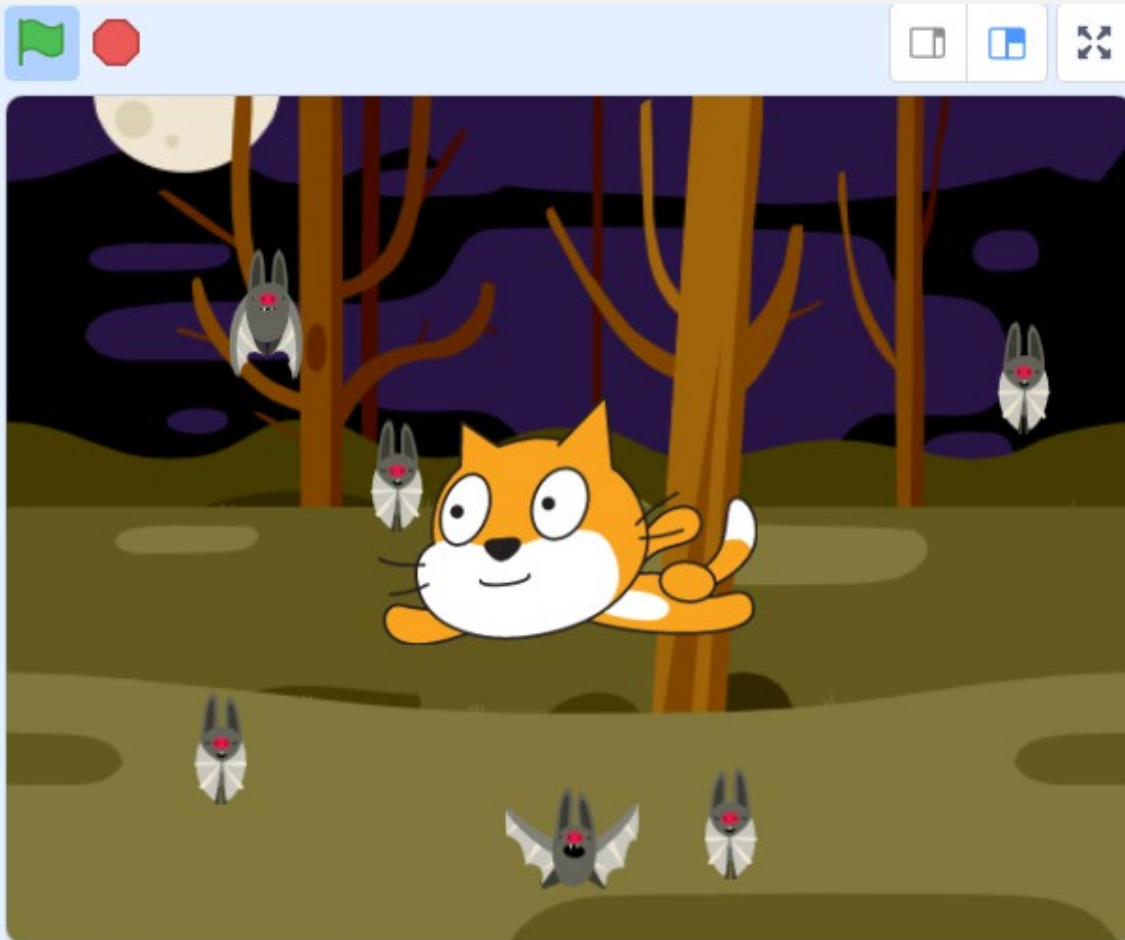
Game Rules #7:

6 bats (size = 40%) in the game, spawn randomly and will move randomly.

Now we will amend the repeat block to 6, because we need 6 bats on the stage.



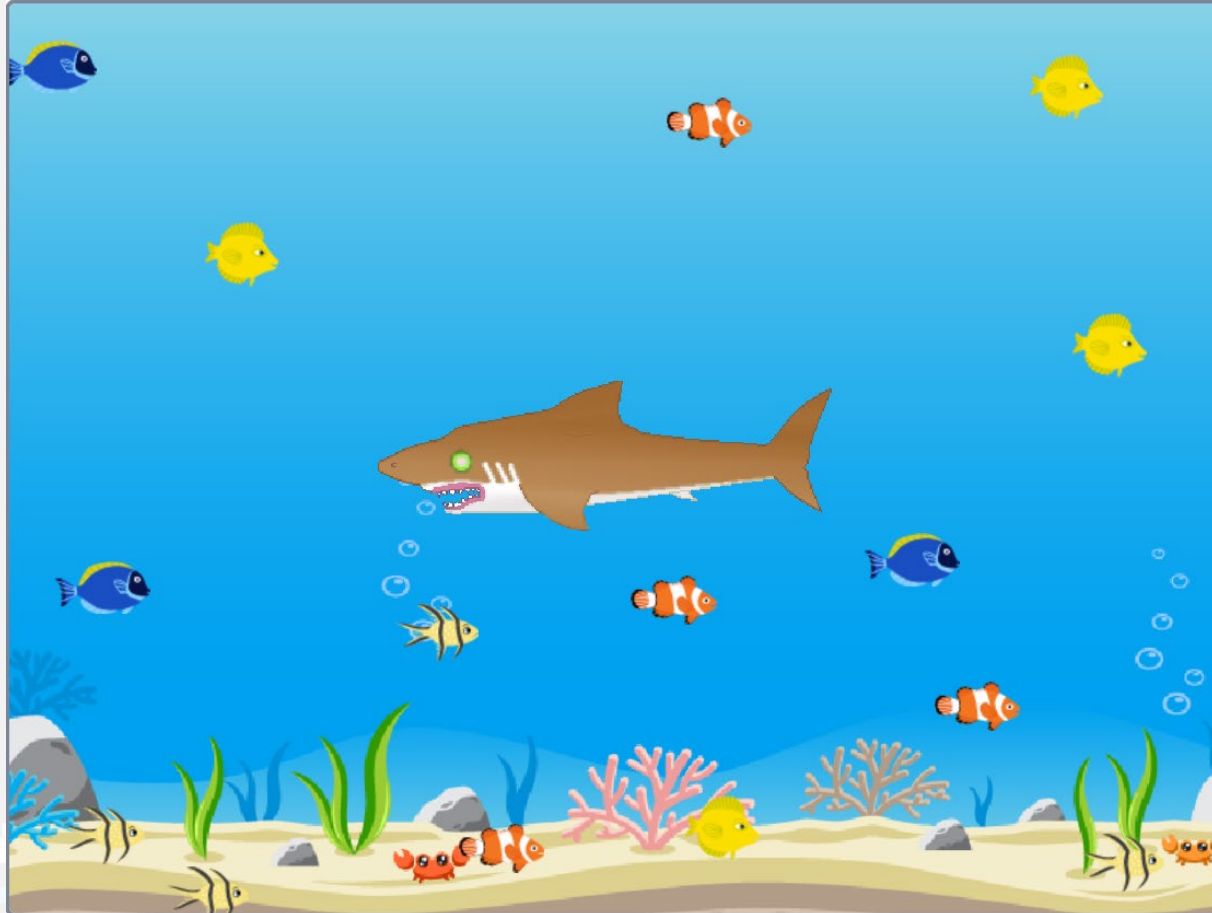
Run the game



After clicking start / flag, you will see 6 bats flying around on the stage.



ASSIGNMENT *for* ***Topic 1.10***



T1.10 – Mission

Create a Shark Game.

The shark can move with arrow keys like the cat in lesson 7, it will open mouth when <space> is pressed.

There will be 12 to 20 fishes (randomly) spawned at start.

The fishes will only be eaten by shark if shark opens its mouth.

[game rules on next page>>](#)

T1.10 – Mission – Game Rules 1

Game Rules (page 1):

1. The sprite “shark” can be downloaded from discord.
2. The backdrop “under the sea” can be downloaded from discord.
3. Fish sprites are from Scratch.
4. Shark size = 60%; Fish = 30%; Backdrop = fullscreen
5. You are able to control your shark with up-down-left-right arrow keys
6. Your shark will start at the centre
7. <space> pressed -> shark-bite
8. <space> not pressed -> shark-swim
9. Shark facing direction: {left pressed = face left; right pressed = face right}
10. Fishes are spawned randomly and with random movement (constant speed).
11. Number of fishes are random, range from 12 to 20.
12. Fish only disappears when touches the open mouth of shark.



T1.10 – Mission – Game Rules 2

Game Rules (page 2):

13. Your sea must have at least 4 types of fishes
14. Each type of fishes cannot contain 2 more fishes in number than other type.
(e.g, fish-a = 4, fish-b = 3, fish-c = 4, fish-d = 3 is great; It can't be fish-a = 5, fish-b = 3, fish-c = 2, fish-d = 4, cause fish-a has more than 2 fishes than fish-b)
15. The fish will bounce back if hitting the edge.



Summary

1. Create clone method is a better and convenient way to spawn multiple sprites on a screen and just direct duplicating sprites.
2. Clone and real body listen to different instruction, real body sprite will execute the blocks that are triggered flag clicked, while clone will execute blocks that placed below “When Start as Clone” block. On the other hand, broadcast will work for both.
3. The clones will inherit all properties from the real body (at the point of time when it is created). By adding “when start as clone” script, you can change the behavior when it is created.



You can direct message your teacher and ask your question through [Slack Robotene Community](#) or arrange a [One-to-One Consultation](#) with your teacher.



Any Questions?



Thank you :)