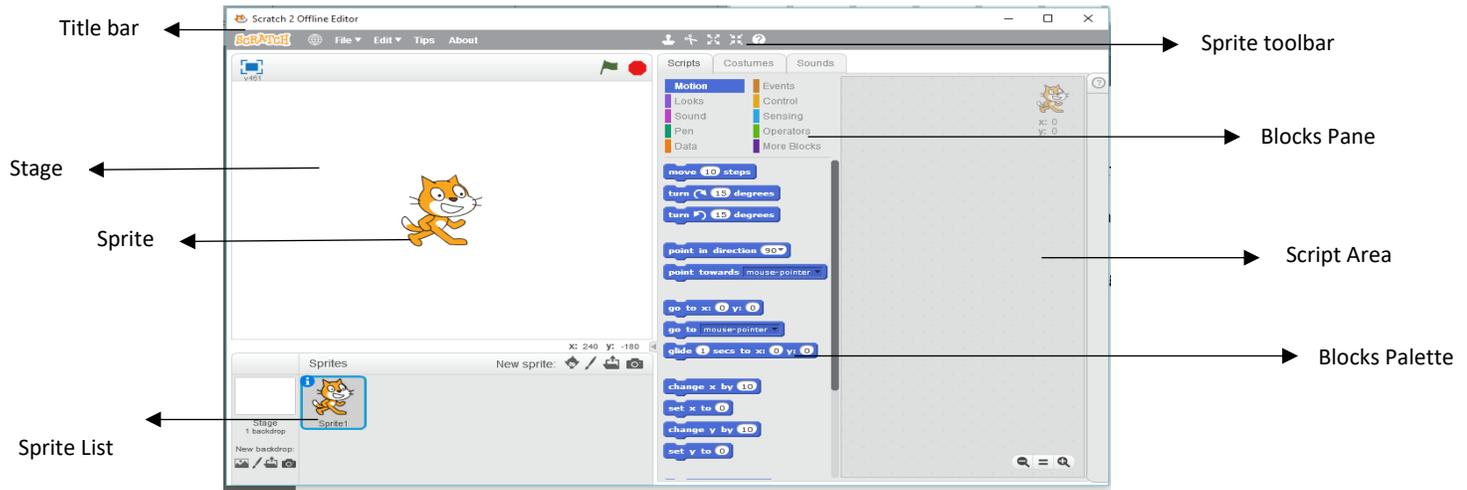


Scratch software was designed for fun, is an educational software and easy to use and learn. It offers tools for creating interactive stories, games, animations, and much more using block-based programming.

OR

Scratch is a new programming language that makes it easy to create interactive stories, games, and animations – and share your creations with others on the web.

When you start a new Scratch project, it begins with a single cat sprite.



Blocks are puzzle-piece shapes that are used to create code in [Scratch](#). The blocks connect to each other vertically like a jigsaw puzzle, where each data type ([hat](#), [stack](#), [reporter](#), [Boolean](#), or [cap](#)) has its own shape and a specially shaped slot for it to be inserted into, which prevents syntax errors. Series of connected blocks are called [scripts](#).

There are ten categories of blocks: [Motion](#), [Looks](#), [Sound](#), [Pen](#), [Data](#), [Events](#), [Control](#), [Sensing](#), [Operators](#), and [More Blocks](#). Only nine of these are shown in the [Block Palette](#).

In total, there are seven [Hat Blocks](#), five [C Blocks](#), thirty-one [Reporter Blocks](#), thirteen [Boolean Blocks](#), two [Cap Blocks](#) and fifty-nine [Stack Blocks](#).

Block Shapes

There are six different block shapes: [Hat](#), [Stack](#), [Boolean](#), [Reporter](#), [C](#) and [Cap](#).

1. Hat blocks



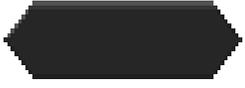
The shape of a Hat block. **Hat blocks** are the blocks that start every script. They are shaped with a rounded top and a bump at the bottom — this is so you can only place blocks below them. There are 11 Hat blocks in the Scratch editor, six of which are in the [Events](#) category, one in the [Control](#) category, and one in the category [My Blocks](#) (if one has created one custom block).

2. Stack blocks



The shape of a Stack block. **Stack blocks** are the blocks that perform the main commands. They are shaped with a notch at the top and a bump on the bottom — this is so blocks can be placed above and below them. There are 77 Stack blocks — the most common block shape.

3. Boolean blocks



The shape of a Boolean block. **Boolean blocks** are the conditions — they are either true or false. For example, asking a computer: "Does $2 + 2 = 4$?", and it would either tell you "Yes" or "No". With a hexagonal shape, there are 13 of these blocks.

4. Reporter blocks



The shape of a Reporter block. **Reporter blocks** are the values. Reporter blocks can hold numbers and [strings](#). It is like asking a friend, for example, "What is $2 + 2$?", and they would answer "4". It can also report a [variable](#). For example, "What is your age?" and they may answer: "15". Shaped with rounded edges, there are 37 of these blocks — not counting the theoretically infinite amount of Reporter blocks that can be made for each variable and list.

5. C blocks



The shape of one of the C blocks. **C blocks** are blocks that take the shape of "C's". Also known as "Wrap blocks", these blocks loop the blocks within the Cs or check if a condition is true. There are five C blocks, and they can be found in the Control category. C blocks can be bumped at the bottom, or capped.

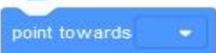
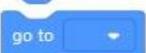
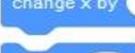
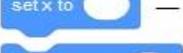
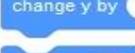
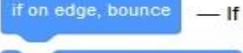
6. Cap blocks



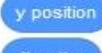
The shape of a Cap block. **Cap blocks** are the blocks that end scripts. They are shaped with a notch at the top and a flat bottom — this is so you cannot place any blocks below them. There are two Cap blocks which can both be found in the Control category.

There are 119 blocks in Scratch 2.0:

Motion blocks are the blocks that control a [Sprite](#)'s movement. There are 17 Motion blocks in Scratch 2.0. Scratch 2.0 has the following fifteen Motion Stack blocks:

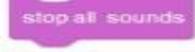
-  — Moves the sprite forward the number of steps in the direction the sprite is facing.
-  — Turns the sprite (clockwise) the specified amount.
-  — Turns the sprite (counter-clockwise) the specified amount.
-  — Points the sprite in the direction.
-  — Points the sprite towards the mouse-pointer or another sprite.
-  — Moves the sprite to the specified X and Y position.
-  — Moves the sprite to the mouse-pointer, a random position, or another sprite.
-  — Glides the sprite to the location, taking as long as the specified amount of time.
-  — Glides the sprite to the mouse-pointer, a random position, or another sprite, taking as long as the specified amount of time
-  — Changes the sprite's X position by the amount.
-  — Sets the sprite's X position to the specified amount.
-  — Changes the sprite's Y position by the specified amount.
-  — Sets the sprite's Y position to the amount.
-  — If touching the edge of the screen, the sprite's direction flips over
-  — This sets the rotation style of a sprite.

Scratch 3.0 has the following three Motion Reporter blocks:

-  — The X position of the sprite.
-  — The Y position of the sprite.
-  — The direction of the sprite.

Sound blocks are the blocks that control sound and MIDI functions. There are 16 Sound blocks in Scratch 2.0. The note blocks in 2.0 are considered an add-on, not one of the standard categories.

Scratch 2.0 has the following eight Sound Stack blocks:

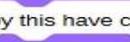
-  — Plays a sound without pausing the script.
-  — Plays a sound and pauses the script until it finishes.
-  — Stops all playing sounds.
-  — Changes the volume by the amount.
-  — Sets the volume to the amount.
-  — Change the pan left/right or pitch by the amount.
-  — Set the pan left/right or pitch to the amount.
-  — Clears any sound effects currently in place.

Scratch 3.0 has the following Sound Reporter block:

-  — The volume.

Looks blocks are the blocks that control a sprite's look. There are 23 Looks blocks in Scratch 2.0. Three of the 19 sprite Looks blocks have a counterpart for the Stage.

Scratch 2.0 has the following eighteen Looks Stack blocks:

-  — A speech bubble appears over the sprite and stays for the specified amount of time.
-  — A speech bubble appears over the sprite and will not go away over time.
-  — A thought bubble appears over the sprite and stays for the specified amount of time.
-  — A thought bubble appears over the sprite and will not go away over time.
-  — Shows the sprite.
-  — Hides the sprite.
-  and  — Changes the sprite's/Stage's **costume/backdrop** to the specified one.
-  — Like the Switch to Backdrop () block, though it waits until all of the hat blocks triggered by this have completed. (Stage only)
-  and  — Changes the sprite's/Stage's costume/backdrop to the next one in the costume list.
-  — Changes the specified effect by the amount.
-  — Sets the specified effect to the amount.
-  — Clears all graphic effects on the sprite.
-  — Changes the sprite's size by the amount.
-  — Sets the sprite's size to the amount.
-  — Puts a sprite in the front or back.
-  — Changes the sprite's layer value by the amount.

Scratch 3.0 has the following three Looks Reporter blocks:

-  and  — The number or name of the sprite/Stage's current costume/backdrop in the list.
-  — The sprite's size.

Data blocks

Variables blocks are the blocks that hold values and [strings](#). There are 5 Variables blocks in Scratch 2.0.

Scratch 2.0 has the following four Variables Stack blocks:

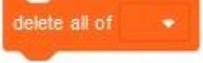
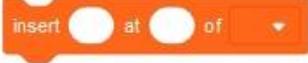
-  — Sets the specified variable to the amount.
-  — Changes the specified variable by the amount.
-  — Shows the variable's **Stage Monitor**.
-  — Hides the variable's **Stage Monitor**.

Scratch 3.0 has the following Variables Reporter block:

-  — The variable's value.

List blocks are the blocks that manage [lists](#). They are stored in the Data category. There are 11 List blocks in Scratch 2.0.

Scratch 2.0 has the following six List Stack blocks:

-  — Adds an item to the list (the item goes at the bottom of the list of items) with the specified content in it.
-  — Deletes the item of the list.
-  — Deletes all items of the list.
-  — Adds an item to the list (the item goes where you specify in the list of items) with the specified content in it.
-  — Replaces the item's content with the specified content.
-  — Shows a list.
-  — Hides a list.

Scratch 3.0 has the following 4 List Reporter blocks:

-  — The list's value.
-  — The item's value.
-  — How many items there are in the specified list.
-  — Reports the index in a list where an item first appears.

Scratch 3.0 has the following List Boolean block:

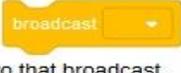
-  — The condition for checking if an item's content is the specified text.

Event blocks are blocks that control events and the triggering of scripts. There are 8 Event blocks in Scratch 2.0.

Scratch 2.0 has the following six Event Hat Blocks:

-  — When the flag is clicked, the script activates.
-  — When the specified key is pressed, the script activates. The event will only be triggered again after the event is released.
-  — When the sprite is clicked, the script activates.
-  — When the backdrop switches to the one chosen, the script activates.
-  — When the first value is greater than the second value, the script activates.
-  — When the broadcast is received, the script activates.

Scratch 3.0 has the following two Event Stack blocks:

-  — Sends a broadcast throughout the Scratch program, activating When I Receive () blocks that are set to that broadcast.
-  — Like the Broadcast () block, but pauses the script until all scripts activated by the broadcast are completed.

Control blocks are the blocks that control scripts. There are 11 Control blocks in Scratch 2.0.

Scratch 2.0 has the following one Control Hat block:

-  (sprites only) — This hat block is triggered whenever a clone is created, and will only be run by that clone.

Scratch 3.0 has the following three Control Stack blocks:

-  — Pauses the script for the amount of time.
-  — Pauses the script until the condition is true.
-  — Creates the specified clone.

Scratch 3.0 has the following five Control C blocks:

-  — A loop that repeats the specified amount of times.
-  — A loop that will never end unless the **Stop Sign** is pressed.
-  — Checks the condition so that if the condition is true, the blocks inside it will activate.
-  — Checks the condition so that if the condition is true, the blocks inside the first C will activate and if the condition is false, the blocks inside the second C will activate.
-  — A loop that will stop once the condition is true.

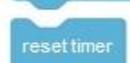
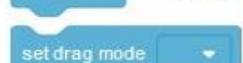
Scratch 3.0 has the following two Control Cap blocks:

-  — Stops the scripts chosen through the drop-down menu. Can also be a stack block when "other scripts in this sprite" is chosen.
-  (sprites only) — Deletes a clone.

Sensing blocks

Sensing blocks are the blocks that detect things. There are 21 Sensing blocks in Scratch 2.0.

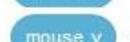
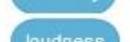
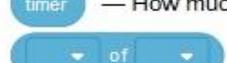
Scratch 2.0 has the following three Sensing Stack blocks:

-  — An input box appears — you type the value in and it stores the value in the  variable.
-  — Resets the timer.
-  — Sets the sprite to draggable or not draggable.

Scratch 2.0 has the following two Sensing Boolean blocks:

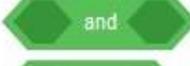
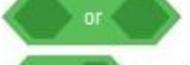
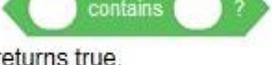
-  — The condition for checking if the specified key is being pressed.
-  — The condition for checking if the mouse is down.

Scratch 2.0 has the following ten Sensing Reporter blocks:

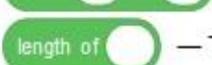
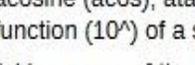
-  — The distance from the sprite to the mouse-pointer or another sprite.
-  — The most recent input with the Ask () And Wait block.
-  — The mouse-pointer's X position.
-  — The mouse-pointer's Y position.
-  — How loud the noise is that the microphone is sensing.
-  — How much time has passed since the Scratch program was opened or the timer reset.
-  — The X position, Y position, direction, costume, size or volume of the Stage or a sprite.
-  — The specified time unit selected.
-  — The number of days since 2000.
-  — The username of a user.

Operators blocks are the blocks that perform math functions and string handling. There are 18 Operators blocks in Scratch 2.0.

Scratch 2.0 has the following seven Operators Boolean blocks:

-  — The condition for checking if a value is less than the other.
-  — The condition for checking if two values are equal.
-  — The condition for checking if a value is greater than the other.
-  — True if both conditions are true.
-  — True if either condition is true.
-  — Makes the condition checked if it is false, not true, or true, not false.
-  Checks if the first parameter's text contains the second parameter's text — if it does, the block returns true.

Scratch 3.0 has the following eleven Operators Reporter blocks:

-  — The value of the addition.
-  — The value of the subtraction.
-  — The value of the multiplication.
-  — The value of the division.
-  — Picks a random number between the two limits.
-  — The two values put right next to each other.
-  — The specified character of the value.
-  — The length of the value.
-  — The remainder of the division.
-  — Rounds the value to the nearest whole number.
-  — The absolute value (abs), square root (sqrt), sine (sin), cosine (cos), tangent (tan), asine (asin), acosine (acos), atangent (atan), natural logarithm (ln), logarithm (log), exponential function (e^), or base 10 exponential function (10^) of a specified value.

Right-clicking some of the blocks will yield more choices of its type.

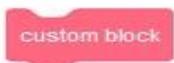
Right-clicking some of the blocks will yield more choices of its type.

My blocks are user-made custom blocks. There are 2 unique kinds of My blocks in Scratch 2.0.

Scratch 2.0 has the following My Blocks Hat block:

-  — Defines a custom block.

Scratch 3.0 has the following My Blocks Stack block:

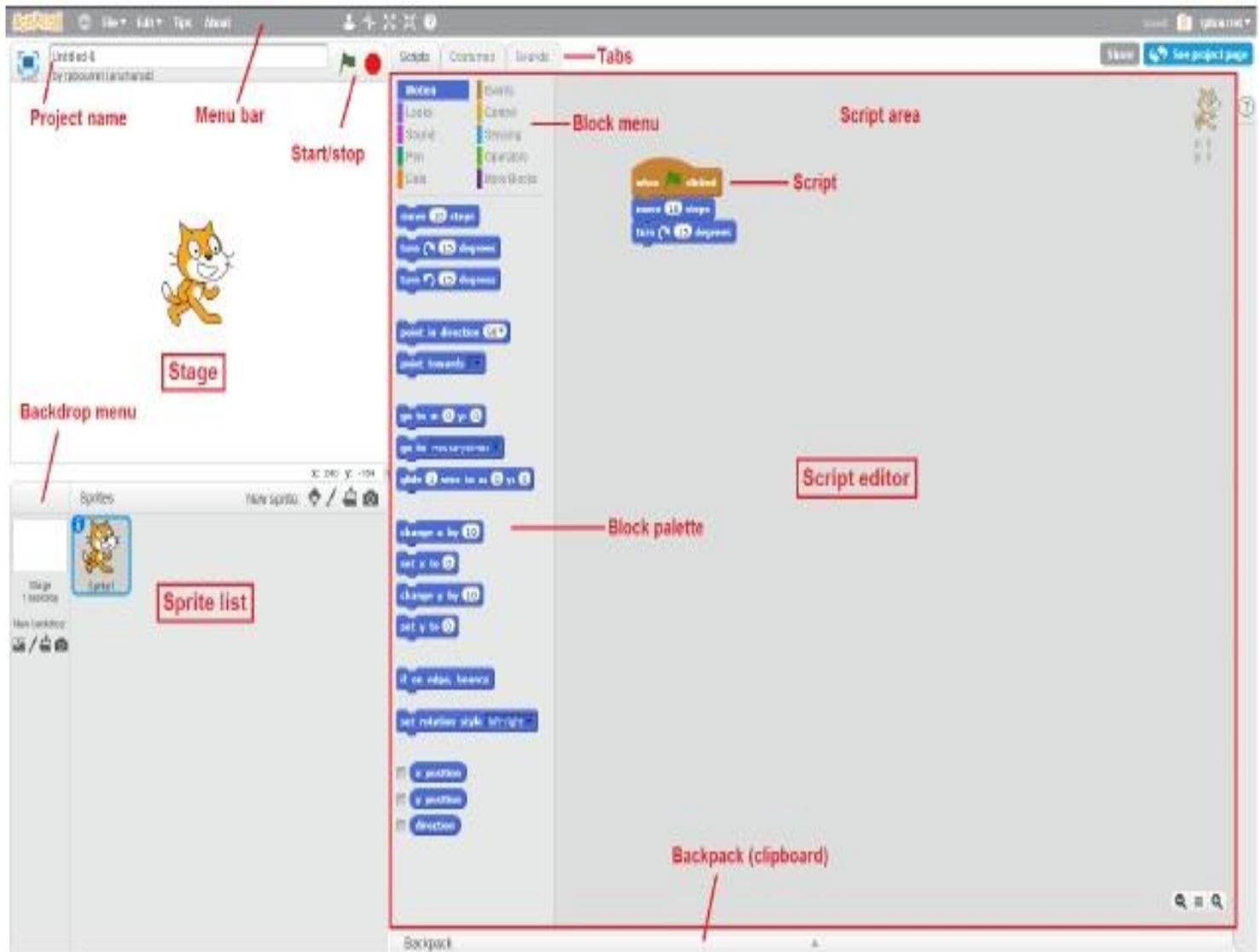
-  — A custom block.

Scratch Editor

The Scratch editor has three main parts:

- **Stage:** Where your program runs.
- **Sprite list:** A list of the sprites (objects) in your program.
- **Script editor / costume editor:** Where you edit your programs or your sprite's pictures.

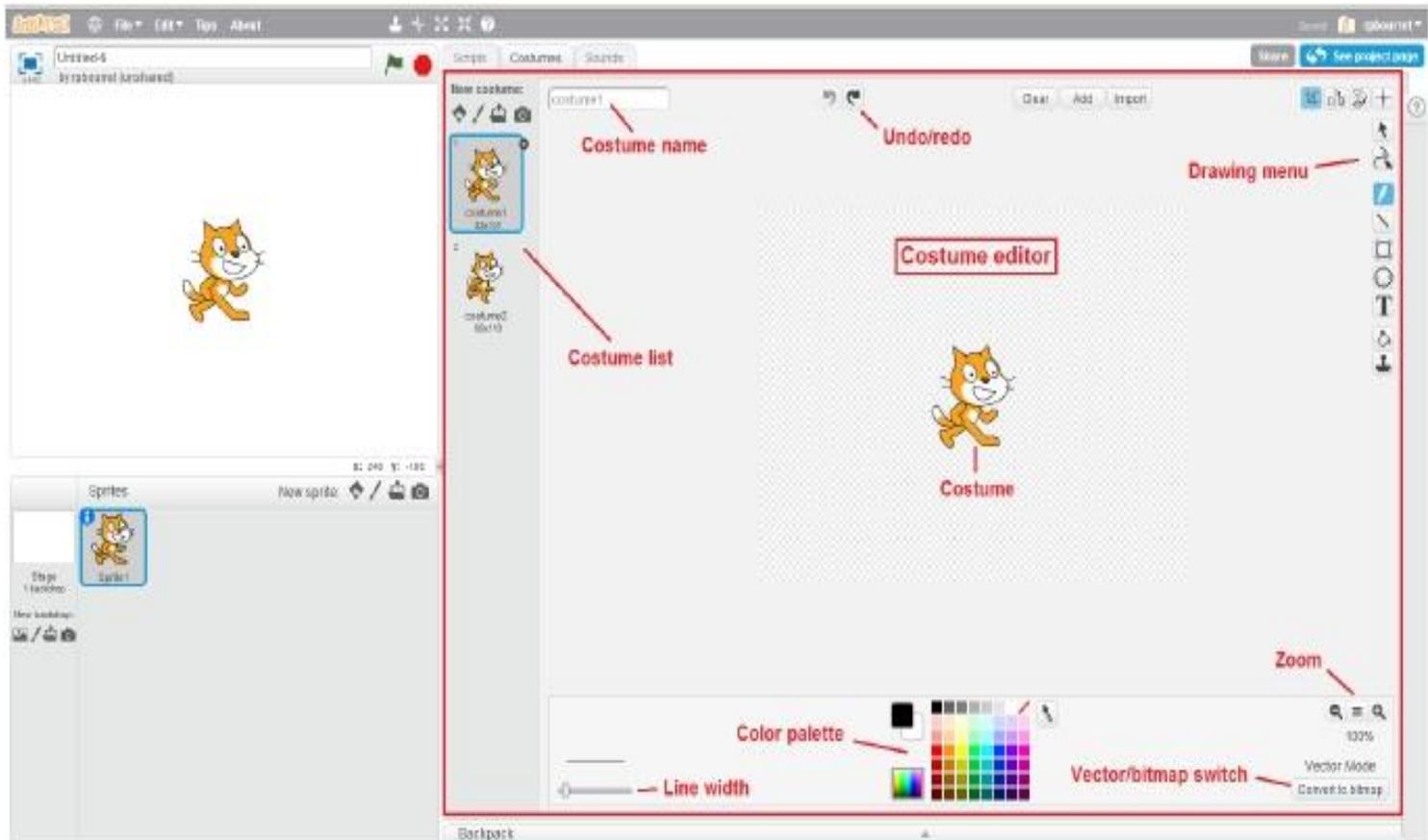
When the *Scripts* tab is chosen, the script editor is shown (outlined in red):



The script editor has three main parts:

- **Script area:** Where you build scripts.
- **Block menu:** Where you choose the category of blocks (programming statements) to use.
- **Block palette:** Where you choose the block to use.

When the *Costumes* tab is chosen, the costume editor is shown (outlined in red):



The *when green flag clicked* block tells Scratch that the other blocks in the script are to be executed at the start of the program — that is, when the green flag is clicked.

COMPONENTS OF SCRATCH WINDOW

1. Title Bar
2. File Toolbar
3. Blocks Pane
4. Current Sprite Info Pane
5. Script Area
6. Blocks Palette area
7. Stage with Sprites
8. Sprite List

BLOCKS PANE

In this area different Blocks are there which are of different color. In scratch 1.4 there are 8 blocks whereas in scratch 2.0 there are 10 blocks.

SCRIPT AREA

It is an area where blocks from blocks palette are placed to write a script. A Script is a collection of blocks that are interlocked with one another for crating animations, stories and games.

Blocks can be removed by dragging the block(s) back from the script area into the blocks palette. The values in blocks can be changed in the script area.

STAGE

The Stage is where you see your stories, games, and animations come to life. Sprites move and interact with one another on the Stage depending on the script written by the user. The Stage is 480 units wide and 360 units tall. It is divided into an x-y grid. The middle of the Stage has an X-coordinate of 0 and a Y-coordinate of 0.

Stage Toolbar: -The stage toolbar is located above the stage. It contains the following tools: -

Duplicate: It helps to make a duplicate copy of the sprite.

Delete: It helps to delete a sprite.

Grow Sprite: It helps to increase the size of a sprite

Shrink Sprite: It helps to Decrease the size of a sprite

Switch to small size :It is used to present the stage in small size

Switch to full size :It is used to present the stage in large size

Switch to presentation mode: It is used to display the stage in full screen and exit from this mode 'Esc' is used.

The user can change the view of the stage by clicking on any of the three buttons present on the left top of the screen. Out of three buttons two are of view mode and one is of presentation mode. Below these buttons there are two more buttons:

- Start green flag scripts-when this button is clicked the script gets activated.
- Stop everything-when this button is clicked all the activated scripts are stopped.

SPRITES

A Sprite is a graphical image, usually animated that a user can interact with and that moves around depending on the scripts entered by user through different blocks.

Working with Sprite

To get more sprites one can select any of the three buttons under: -

New sprite buttons: -

- a) Paint new sprite
- b) Choose a new sprite from file
- c) Get surprise sprite

New sprites can also be chosen from the images downloaded from the web. The image format supported by Scratch are JPG, BMP, PNG and GIF.

Editing a Sprite: - Editing features like Duplicate, Delete, Grow Sprite and Shrink Sprite are present in the sprite toolbar just above the stage.

Creating a Costume of a sprite-

Current Sprite Info: -

Sprite List: -

Background: -

Writing Script with Different Blocks: -

To program a sprite, drag blocks from the Blocks Palette to the Scripts Area. To run a block, click on it.

Create scripts (programs) by snapping blocks together into stacks. Click anywhere on the stack to run the whole script, from top to bottom.