

Scratch-Introduction

Scratch is a **visual programming language** that provides a rich learning environment for people of all ages. It allows you **to create interactive, media-rich projects, including animated stories, book reports, science projects, games, and simulations.** Scratch's visual programming environment enables you to explore areas of knowledge that would otherwise be inaccessible. It provides a full set of multimedia tools you can use to create wonderful applications, and you can do so more easily than with other programming languages.

Scratch is a modern programming language that appeals to students or individuals who have never thought of becoming programmers before or who are new to programming. It is based on a language called **Smalltalk**, another programming language. The Scratch project started in 2003 and was developed and written at the Media Lab of the **Massachusetts Institute of Technology (MIT)** by the Lifelong Kindergarten group, and the Scratch software and website was officially publicly released in 2007.

It's designed for kids aged 8-16, but it's good way for someone of any age to learn programming. Creating a project in Scratch is as easy as snapping the colour-coded blocks together.

Scratch Uses:

Programming offers important advantages; for instance, it significantly increases the range of what you can create with the computer and in what way you can express yourself. It also enhances your range of learning.

Scratch helps the children develop creative thinking, systematic reasoning, and cooperative learning, which are important skills for living in the 21st century.

Children learn the key mathematical concepts such as variables, coordinates, and random numbers and understanding of iteration and conditionals, which are the essential concepts of computation.

Gain an understanding of the basics of programming and then often move on to other programming languages when their interest is developed.

Anyone can code:

In digital age, an understanding of code and how it works is a useful skill. It can transform you from someone who uses other people's software into someone who can make it.

Code means a set of written instructions for computer. The Computers, Mobile Phones, websites and services..... All depend on software.

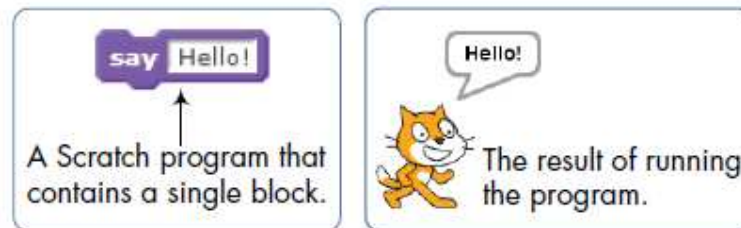
A computer program is just a set of instructions that tell a computer what to do. You write these instructions using a programming language.

Most programming languages are text based, which means you have to give the computer commands in what looks like a cryptic form of English. For example, to display "Hello!" on the screen, you might write:

```
print('Hello!') (in the Python language)  
std::cout<< "Hello!" <<std::endl; (in the C++ language)  
System.out.print("Hello!"); (in the Java language)
```

Learning these languages and understanding their syntax rules can be challenging for beginners. Scratch, on the other hand, is a visual programming language. It was developed in the Massachusetts Institute of Technology (MIT) Media Lab to make programming easier and more fun to learn.

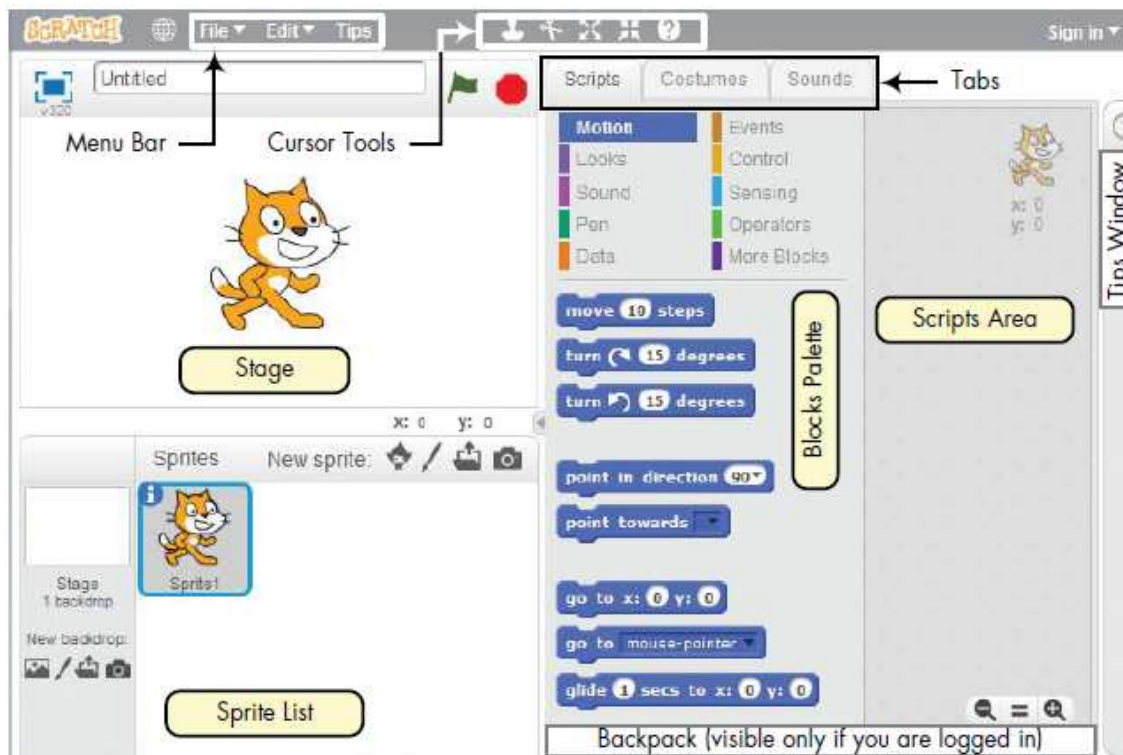
In Scratch, you won't type any complicated commands. Instead, you'll connect graphical blocks together to create programs.



The cat that you see in the above Figure is called a **sprite**. Sprites understand and obey sets of instructions that you give them. The purple block on the left tells the cat to display "Hello!" in a speech bubble. Many of the applications you'll create in this book will contain multiple sprites, and you'll use blocks to make sprites move, turn, say things, play music, do math, and so on.

Project:

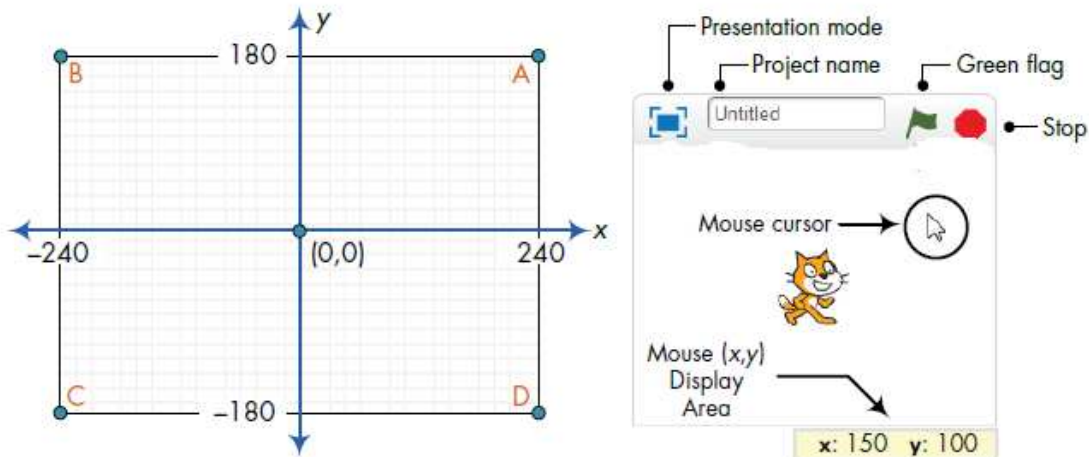
The creation made in the Scratch Program is called a 'project'. Projects can be animations, games, simulations, pieces of art or music, or anything else possible, which is created with the Scratch software.

Scratch Programming environment:

In the Scratch Editor, the main parts are: the Stage (top left), the Sprite List (bottom left), and the Scripts tab (right), which contains the Blocks tab and the Scripts Area.

The Stage– *Your program will run here.* The Stage is where your sprites move, draw, and interact. *The Stage is 480 steps wide and 360 steps tall.* The centre of the Stage has an x-coordinate of 0 and a y-coordinate of 0.

It is similar to a sprite but cannot move. Instead of costumes, it has backgrounds, called backdrops. The stage is where you see your stories, games, and animations come to life. The stage is considered the background of a project, it can have backdrops with different costumes, scripts, and sounds, just like a sprite.



Presentation mode icon hides all scripts and programming tools and makes the Stage area take up almost your entire monitor. The edit box shows the name of the current project. The green flag and stop icons let you start and end your program.

Sprites – The objects that move around on the stage. All the projects are composed of 'sprites,' which are two-dimensional objects or pictures that have their own codes associated with them.

Sprite info– Displays information about each sprite, such as how big it is, what its position is in x and y planes.

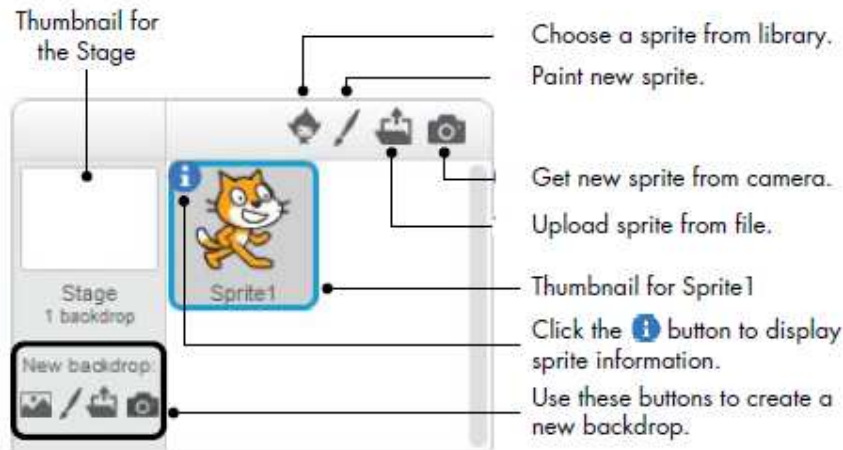
Sprite List:

The Sprite List displays names and thumbnails for all the sprites in your project. New projects begin with a white Stage and a single cat-costumed sprite.

You add new sprites to your project from one of four places: Scratch's sprite library, the built-in Paint Editor (where you can draw your own costume), a camera connected to your computer, or your computer.

Each sprite in your project has its own scripts, costumes, and sounds. You can select any sprite to see its belongings. Either (1) click the sprite's thumbnail in the Sprite List or (2) double-click the sprite itself on the Stage.

The currently selected sprite thumbnail is always highlighted and outlined with a blue border. When you select a sprite, you can access its scripts, costumes, and sounds by clicking one of the three tabs located above the Scripts Area.



Backdrop:

A backdrop is an image that can be shown on the Stage. It is similar to a costume, except that it is shown on the stage instead. They are located in the backdrops' library. You can choose new backdrops from the library, can paint them, upload them, or choose as a surprise. The Stage can change its look to any of its backdrops using one of the code blocks. They can be named, edited, created, and deleted in the Paint Editor.

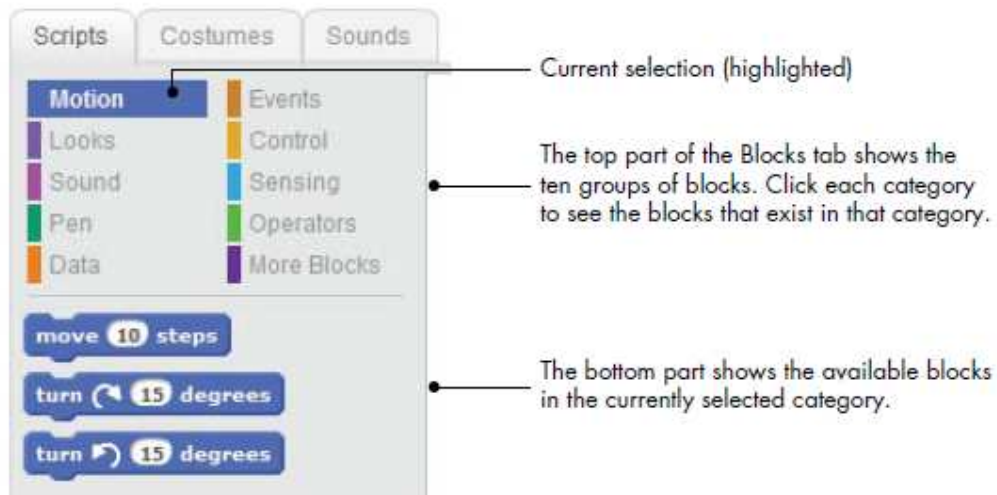
Main Tab– Switch from coding, drawing, or adding sound. When you are designing your project/games, you may need to switch between the three main tabs of the Scratch Editor. These areas allow you to code, alter the appearance of your sprites, or assign a sound to a sprite.

The **scripts tab** allows code blocks to be dragged into the Scripts area. In order to optimize how your sprite looks, select the **Costumes tab**. You can incorporate a new sound in your project through the **Sounds tab**.

Script Tab

Script Blocks in Scratch are divided into 10 categories (palettes): Motion, Looks, Sound, Pen, Data, Events, Control, Sensing, Operators, and More Blocks. Blocks are color coded to help you find related blocks easily.

You have to provide a set of instructions to the computer to follow when programming, for example, 'play a sound', 'move up', 'move down'. In Scratch, every such instruction is called a command block. Command blocks are actually the basic building blocks that you will be playing with. You pin them together on the screen to create instructions. Every block command the computer to perform actions when the command is executed.



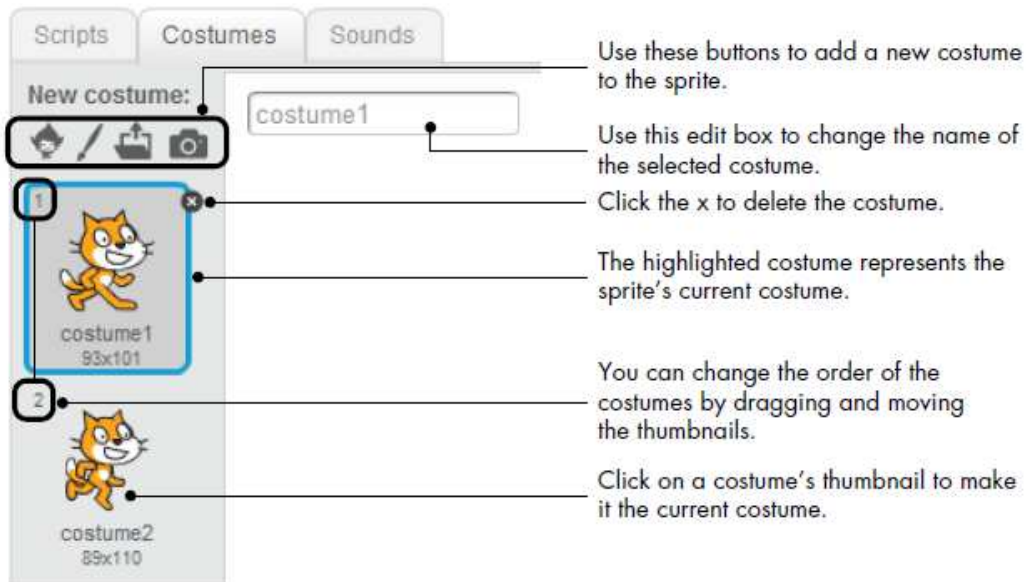
Scripts Area

To make a sprite do interesting things, you need to program it by dragging blocks from the Blocks tab to the Scripts Area and snapping them together. When you drag a block around the Scripts Area, a white highlight indicates where you can drop that block to form a valid connection with another block.



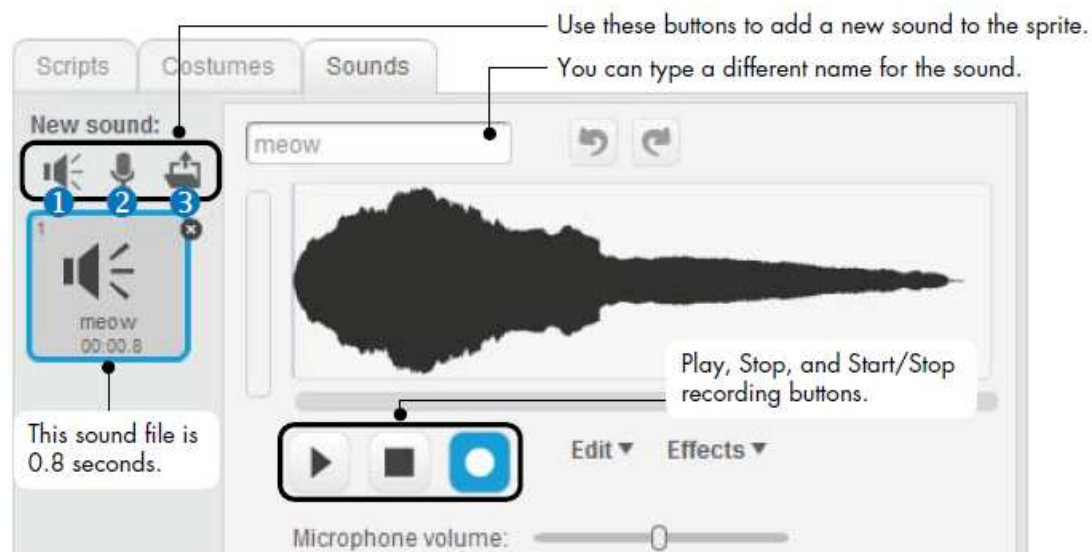
Costumes Tab

You can change what a sprite looks like by changing its costume, which is just an image. The Costumes tab contains everything you need to organize your sprite's costumes; you could think of it like a clothes closet. The closet can have many costumes, but a sprite can wear only one at a time.



Sounds Tab

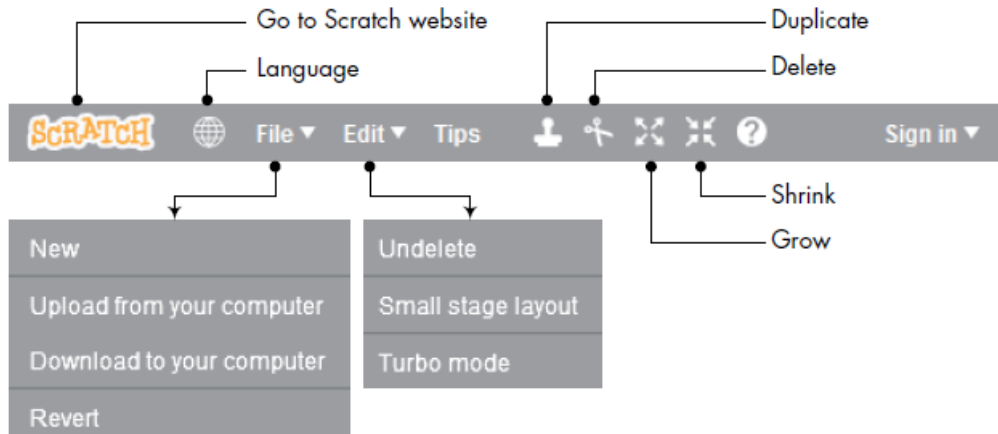
A sound is an element which you can hear and play in a Scratch project; it is available in the built-in sound library of Scratch, can be imported, or can be recorded. Sound blocks are used to play the sounds that also regulate the tempo, volume, etc. of a sound.



Most of the time, you'll need only the three buttons at the top of the Sounds tab. They allow you to choose a sound from Scratch's sound library, record a new sound (if you have a microphone), or import an existing sound file from your computer. Scratch can read only MP3 and WAV sound files.

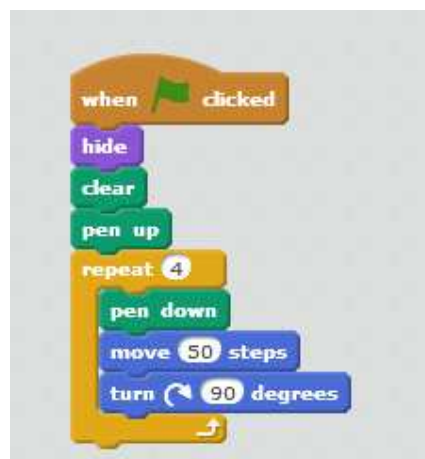
Toolbar

You can change the language, use the File, Edit, and Tutorials options when required.



Scripts

Sprites can have multiple and a stack of command blocks, called scripts. Scripts are built by connecting single command blocks together into a stack. When you click on a script, Scratch runs the blocks from top to bottom. The computer starts at the top and executes the instructions you tell it one after the other. A script can be very short (only two or three blocks long), or it can be very long. A sprite might have just one script, many scripts, or none at all. It is possible for a single sprite to have multiple scripts initiated by the same event. In that case, all scripts will be executed simultaneously.



It is easy to work with the scripts.

The following instructions can help you:

- You simply have to drag the blocks out of the Block Palette to the script/code area to create a script and organize them meaningfully.
- Blocks are dragged on to assemble them; they can be added below or in any other block, except the Hat Blocks.
- Blocks must be dragged away from one another to disassemble them.
- To eliminate a script, right-click its hat block, click delete, or drag and leave that script into any block palette.
- To begin a script, just click on it.

Scratch blocks

Scratch has four kinds of blocks: command blocks, function blocks, trigger blocks, and control blocks.

Command blocks and control blocks (also called stack blocks) have bumps on the bottom and/or notches on the top. You can snap these blocks together into stacks. Trigger blocks, also called hats, have rounded tops because they are placed at the top of a stack. Trigger blocks connect events to scripts. They wait for an event—such as a key press or mouse click—and run the blocks underneath them when that event happens. For example, all scripts that start with the when green flag clicked block will run when the user clicks the green flag icon.

