

# Computer Coding is Cool



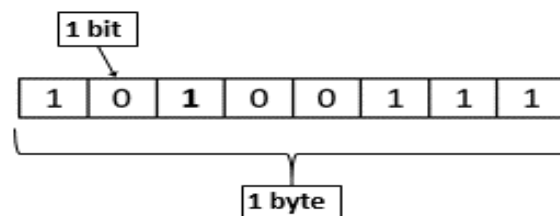
Over 50 years ago, scientists invented something called a vacuum tube. Unlike household vacuums that clean dust and dirt from your carpet, vacuum tubes helped electricity to flow through circuits while turning on and off in meaningful patterns. Vacuum tubes made it possible to invent televisions and computers and other things that relied on these on-off patterns. The problem was they were big and expensive and they tended to overheat and burn out easily.

Fortunately, transistors were also invented not long after the vacuum tube. Like vacuum tubes, transistors help electricity to flow and turn on and off in patterns. But, unlike vacuum tubes, they are hundreds of times smaller so you can use them to make lots and lots of circuits that are connected to one another, or integrated, in meaningful ways.

As transistors were being developed, so was something called a microchip. The microchip provided a place for all the electrical parts of a circuit to be located. These days, each microchip can hold millions of transistors each of which can be used in an integrated circuit. In addition, microchips also store information in the form of computer memory.

The information in a microchip is stored in a kind of “alphabet” known as binary code. Binary code, also called machine code, takes into account the fact that computers can only produce two types of data: on and off. As we learned earlier, these on-off patterns are produced by the transistors within each microchip. It is kind of weird to realize that the complex functions of modern computers are the result of something so simple.

To make this even easier for humans to understand, we have assigned a symbol for “on” and a symbol for “off”. While we could have chosen something like “A” for on and “B” for off, someone smartly decided to use numbers instead. Since zero already refers to nothing or zilch, it is the perfect fit to represent “off” for a computer. And since only one more symbol was needed, it only seems logical that 1 was the choice for “on”. So our super simple computer code alphabet has only two letters – make that numbers.



One unit of this code, either a 0 or a 1, is sometimes known as a bit. Bits, as you might have guessed, are often placed into groups like the letters in a word. By grouping single bits together in larger and larger groups, computers can use binary code to find, organize, send, and store more and more kinds of information. The most common way they are grouped is into sets of eight with each set of eight is commonly known as a byte.

In this STEM Challenge, your job is to artistically represent a significant thing, person or idea in binary code. You must do this using objects to represent the 1's and 0's of this incredible code.