How to Count in Binary

0:10   Binary is the fundamental communication block of computers, but it's used to represent more than just text and images. It's used in many aspects of computing like computer networking, which you'll learn about in a later course. It's important that you understand how computers count in binary. We've shown you simple lookup tables that you can use like the ASCII to binary table, but as an IT support specialist, whether you're working on networking or security, you'll need to know how binary works. So let's get started. You'll probably need a trusty pen and paper, a calculator, and some good old-fashione brain power to help you in this video. The binary system is how our computers count using ones and zeros, but humans don't count like that. When you were a child, you may have counted using ten fingers on your hand. That innate counting system is called the decimal form or base-10 system. In the decimal system, there are 10 possible numbers you can use ranging from zero to nine. When we coun binary, which only uses zero and one, we convert it to a system that we can understand, decimal. 330, 250, 2, 40, 4 million, they're all decimal numbers. We use the decimal system to help us figure out wha bits our computer can use. We can represent any number in existence just by using bits. That's right. And we can represent this number just using ones and zeros. So how does that work? Let's consider these numbers: 128, 64, 32, 16, 8, 4, 2, and 1. What patterns do you see? Hopefully, you'll see that each number is a double of the previous number going right to left. What happens if you add them all up? You get 255. That's kind of weird. I thought we could have 256 values for a byte. Well, we do. The zero is counted as a value, so the maximum decimal number you can have is 255. What do

you think the number is represented here? See where the ones and the zeros are represented. Remember, if our computer sees a one, then the value was on. If it sees a zero, then the value is off. If you add these numbers up, you'll get a decimal value. If you guessed 10, then you're right. Good job. If you didn't get it, that's okay too. Take another look. The 2 and 8 are on, and if we add them up, we get 10. Let's look at our ASCII to binary table again. The letter h in binary is 01101000. Now, let's look at an ASCII to decimal table. The letter h in decimal is 104. Now, let's try our conversion chart again. 64 plus 32 plus 8 equals 104. Look at that. The math checks out. Now, we're cooking. Wow! We've gone over all the essentials of the basic building blocks of computing and machine language. Next, you're going to learn how we build on top of this layer of computing to perform the task you'll do day to day.