Counted Loops in Alice – The Loop Instruction

Concept: The Loop instruction causes one or more other instructions to repeat a certain number of times.

It is frequently necessary for an instruction (or multiple instructions) to be repeated several times in a program. The simplest way to accomplish this is to make multiple, identical copies of the instruction, and have them execute in order.

A shorter and more sensible solution would be to have the instruction repeat itself a specified number of times. This is the purpose of a counted loop, which is a type of repetition structure.

In the Handout Folder, you will find an Alice world called Fan. The Fan object is an instance of the Fan class from the Web Gallery. To provide proper animation, the blades of the fan should rotate multiple times. The roll method can be used to accomplish this.

The current program has the fan blades doing 5 rotations, with each rotation performed as a single command. Thus we need to have 5 copies of the same command to produce 5 rotations.

Rather than using the inefficient copying and pasting of instructions, we can use a (counted) Loop to accomplish the same motion with far more clarity and efficiency.

Another advantage in organizing the program this way comes from the ability to easily modify the program. Suppose we decide to have 8 rotations, instead of 5. With a counted loop, we only need to change the value of the loop counter.
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Tutorial 4-3: Using the Loop Instruction

Problem Statement:

Create an Alice world with a clock that has a minute hand and an hour hand. The clock should simulate the movements that the hands would make when keeping time. The minute hand should make one full revolution each hour, while the hour hand makes 1/12 of a revolution. The clock should make these movements for a total of 12 simulated hours.

1. Copy the ClockLoop world from the Handout folder to your own workspace and then open it.

2. Drag a Loop instruction into the Method Editor. Set the number of repetitions to 12.

3. Expand the clock object so you can see its subparts, the minute hand and hour hand.

4. Select the minute hand and drag the roll method into the Loop. Set the minute object to roll left one revolution.

5. Select the hour hand and drag the roll method into the Loop. Set the hour object to roll left 1/12 of a revolution.

6. Save the world and play it.

7. You may have noticed that it doesn't move like a real clock. Improve the animation of your clock to more closely resemble an actual clock.
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Infinite Loops

When selecting the number of times you want to have the loop repeat, one of the choices in Alice is *infinity times*. If you select this option, the loop will repeat without ending until the world is stopped by the user. This is called an *infinite loop*.

Under most circumstances, you don't want infinite loops, and in traditional programming languages, they are generally caused by programming errors. Since most Alice programs involve animation, there are more exceptions in Alice where an infinite loop might be useful.

If an object has a subpart that should be continuously animated throughout a scene, you could use an infinite loop to produce this effect. The rest of the animation in the scene can be combined with the infinite loop using the *Do together* command.

For example, we might be using our animated clock from the tutorial in the background of a scene that takes place in a school room. While the other animation occurs in the foreground, the clock in the background should run smoothly.