Conditional Statements part 1

Interesting points:

> What is an IF?

> Why do we need it?

> When do we need it?

> Examples

Conditional constructs... What are these?

Conditional constructs are structures consisted of commands. These commands/actions will be executed upon a condition (meaning a logic test) that evaluates to true or false. Conditional constructs are engineered through IF instructions. Let us be more detailed:

An IF instruction is a conditional statement which will perform an action only if a condition/ test is evaluated as true. **If** the test is true, **then** a set of actions will be executed. **Otherwise**, if the test is false, another set of actions will be executed.
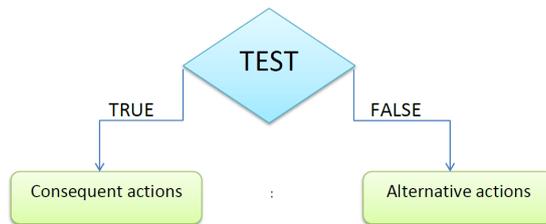
Sometimes there is no need for an alternative set of actions, and the IF/THEN/ELSE is reduced to an IF/THEN. These two forms can be represented by the pseudo codes below (graphical representations follow):
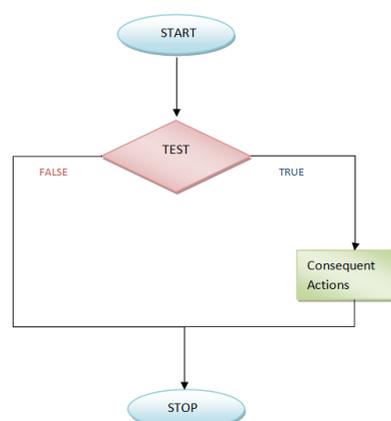
```
    IF
   (test)
    THEN
(consequent action)
    ELSE
(alternative action)
```
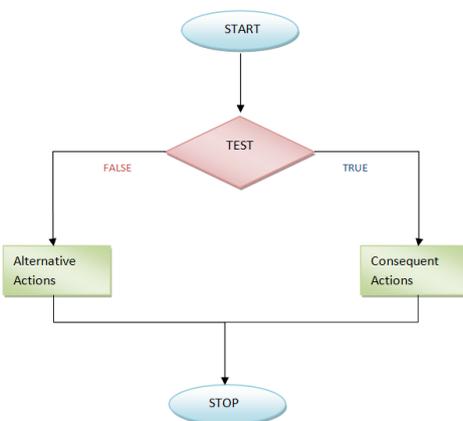
```
    IF
   (test)
    THEN
(consequent action)
```


The consequent action and the alternative action are not limited to one and only one action. The user can give several actions. For this reason we are usually use the term **'set of actions'**.

USEFUL TIPS

You can boil an **IF construct** down to these steps:

1. Check to see if the expression between the parentheses is true or false.
2. If it is true, then run the code block right under the if -statement.
3. If it is false, then skip the code and just proceed to run the next parts of the program code.

You can boil an **IF/THEN/ELSE** construct down to these steps:

1. Check to see if the expression between the parentheses is true or false
2. If it is true, then run the code block right under the THEN-statement. After this execution, control returns to the point after the end If.
3. If it is false, then run the code block right under the ELSE- statement. Once you do this proceed to run the parts of the program code outside the conditional construct. After this execution, control returns to the point after the end If.

Conditional Statements part 1

Why do we need conditional statements?

A conditional statement is actually a structure that provides a deep level of control over what happens when the program is being executed.

In this sense, the main function of a conditional statement is to give the programmer a level of control of the flow of statements executing when an application runs.

An IF instruction can be compared to a closed question: there is only two possible answers to the statement tested (yes or no/ true or false) and each answer triggers a certain amount of consequent actions.

For example, the sentence: '*I wonder what the weather is like outside. If it's sunny I should get dressed and go outside, other-* *wise I can stay home and read a book*' can be summed up into the IF/THEN/ELSE structure.

We can easily realize that the conditional construct IF/THEN/ELSE causes branches in the path of execution based on the outcome of the test.

More examples like this:
'*I wonder if there are cookies left in the box. If there are I ll take one. I ll also prepare a tea. If there are not, I ll go to the supermarket to buy and I ll refill the box.*

When do we need conditional statements?

'The IF statement is used to test for a condition and then execute sections of code based on whether that condition is True or False'.

If we want to **control the flow of code execution** depending on

- what the program has already done or
- what it has just emerged

we need to use conditional constructs.

As we have previously mentioned, conditions that evalu- ate to true or false are used to test what has the program already done, what has just emerged etc.

When we want to tell our program to execute a certain section of code *only if* a particular test evaluates to true, we use a simple IF/THEN statement. When we want to provide a secondary path of execution when an "if" clause evaluates to false, we use an if-then-else statement

To sum up, when we want to decide whether to perform an action or not, we can take this decision by using a conditional construct and evaluating a condition.

Conditional Statements in cMinds...

In the cMinds demonstrator, the IF code automatically adapts to its environment.

When the IF is dragged and dropped, a field to put the test appears immediately, guiding the user. A little upside-down IF appears also, to signal the end of this piece of code.

Once the test is dragged in place, automatically a THEN image appears with a field to put the consequent action.

Once the consequent action is dragged, an ELSE image appears with a field to put the consequent action and a cancel button if a simple IF/THEN is required.

If you address the correct orders, you will regulate my behaviour

The reader is also encouraged to study material available online at: http://www.cminds.org/documents/Supporting%20Material% 201_509998-2010-COMENIUS.pdf

Conditional Statements part 1

Can you now give us an example from the tutorial area?

Tutorial area

Let's consider the case where the user wants to instruct the robot to jump over an obstacle if there is one on the way and otherwise to keep walking.
To give this instruction to the robot, the user will have to use an IF/THEN/ELSE construct.

The script ▶ ▶

Which is the condition that evaluates to true or false? ▼

There is an obstacle ahead

Graphical representation ▼

IF

There is an obstacle ahead

THEN — ELSE

Jump — Walk

END OF THE IF

## Can you now give us an example from the Friezes activity?

The Friezes

We would like to check if there is a blue square before the question mark. If there is, we will place a blue square on the question mark. If there is not, we will place a cyan lozenge on the question mark.

The script ▶ ▶

Which is the condition that evaluates to true or false? ▼

There is a blue square before the question mark

IF

There is a blue square before the question mark

THEN — ELSE

Place a blue square on the question mark — Place a cyan lozenge on the question mark

END OF THE IF
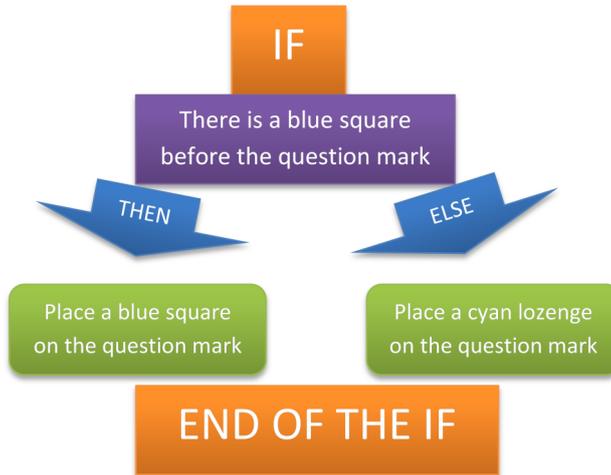
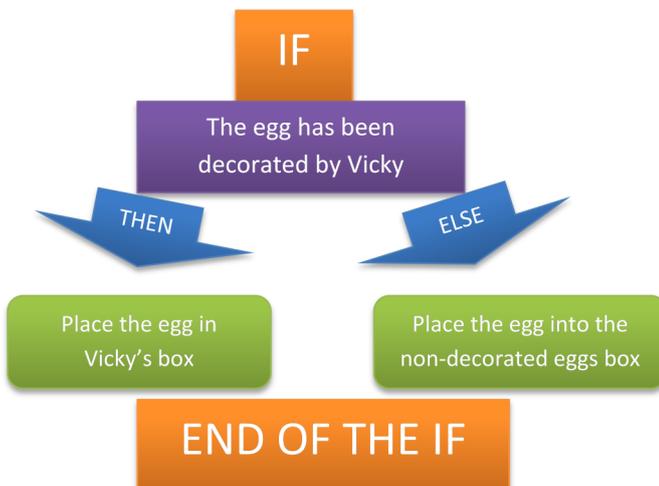## Can you give us an example from the Easter Eggs activity?

The Easter Eggs

We would like to check if the egg that the robot holds is decorated by Vicky or if it has no pattern. If it is decorated by Vicky, it will be placed into Vicky's box; otherwise it will be placed into the box that is used to hold the non decorated eggs.

The script ▶ ▶

Which is the condition that evaluates to true or false? ▼

The egg has been decorated by Vicky.

IF

The egg has been decorated by Vicky

THEN — ELSE

Place the egg in Vicky's box — Place the egg into the non-decorated eggs box

END OF THE IF

Conditional Statements part 1

Can you give us more examples from the tutorial area?

Tutorial area

Let's consider the case where the user wants to instruct the robot to pick and apple and to place it into the basket only if the apple is ripe. Otherwise, the apple is thrown away. To give this instruction to the robot, the user will have to use an IF/THEN/ELSE construct.
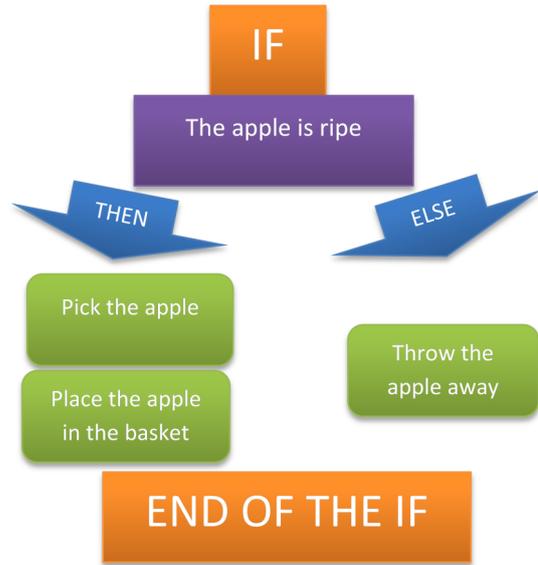
The script ▶ ▶

Which is the condition that evaluates to true or false? ▼

The apple is ripe

Graphical representation ▼

IF

The apple is ripe

THEN — ELSE

Pick the apple

Place the apple in the basket

Throw the apple away

END OF THE IF

Can you give us a more complex example?

Easter Eggs

We would like to check if the egg that the robot holds is decorated by Vicky, by Jeff or if it has no pattern. If it is decorated by Vicky, it will be placed into Vicky's box; if it has been decorated by Jeff it will be placed into Jeff's box; if it has no pattern, it will be placed into the box that is used to hold the non decorated eggs.

To give this instruction to the robot, the user will have to use three IF/THEN constructs

The script ▶ ▶

Which are the conditions that evaluate to true or false? ▼

The egg has been decorated by Vicky

The egg has been decorated by Jeff

The egg has no decoration

Pick an egg

IF

The egg has been decorated by Vicky

THEN

Place the egg into Vicky's box

END OF THE IF

IF

The egg has been decorated by Jeff

THEN

Place the egg into Jeff's box

END OF THE IF

IF

The egg is not decorated

THEN

Place the egg in the box for the non-decorated eggs

END OF THE IF