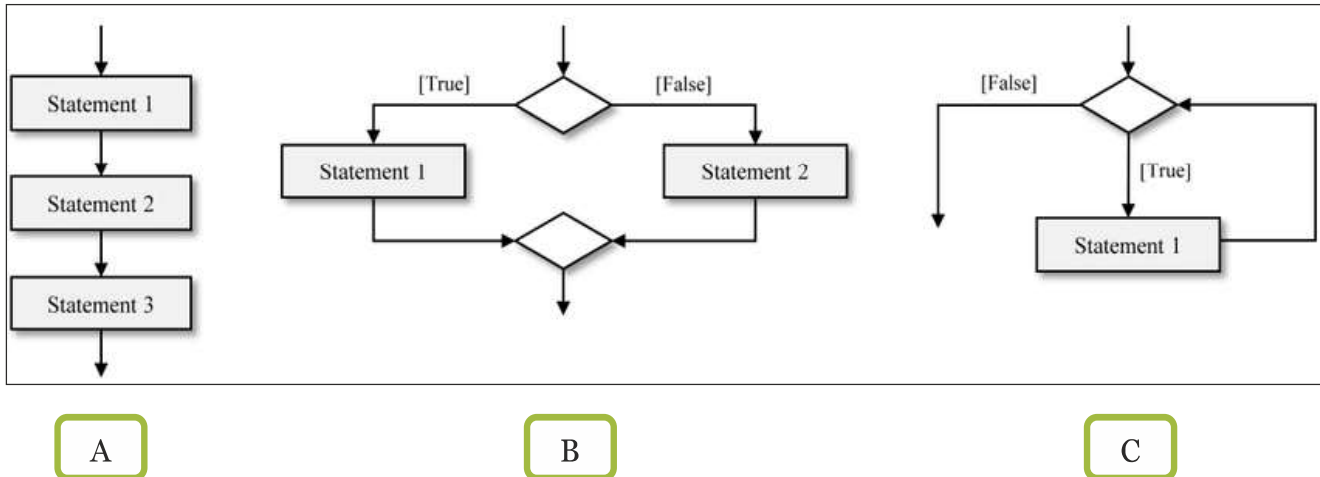


Chapter-4

CONTROL STRUCTURES

Familiar



What if I say that you are very familiar with control structures.

- In fact you use these structures in your daily life.
- Also you have been using them for the last few classes.

Take a guess, which among the above diagram is a

- Loop (Iteration),
- Sequence,
- Condition(Selection)

A is _____

B is _____

C is _____

Let's understand

When we are using software or carrying out our general day-to-day tasks. We subconsciously make use of these structures.

- ❖ **Its Raining** - If it is raining we wear a raincoat. If it is not raining we do not wear it. This is basically a **Condition (Selection)** structure where you are taking decision based on a condition.



- ❖ **To brush teeth**, you first pick your tooth brush then you open the lid of tooth paste, then you squeeze tooth paste and so on.... These are basically steps performed one after another to carry out a task. This is basically a **Sequence structure**.



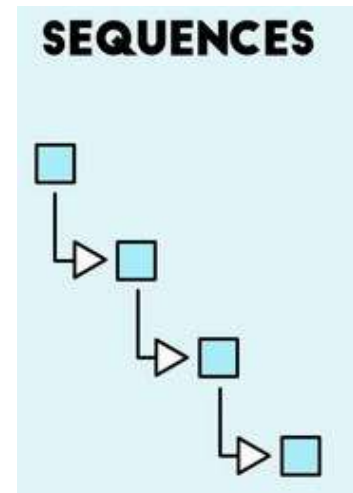
- ❖ Assume you are **bowling in a cricket match**. You have to bowl 6 balls to complete one over. You will first take a ball and then run towards a batsman and you will bowl it. After completing one ball, you will again bowl the next ball. Again after second ball, you will bowl a third ball. You are basically repeating the same step for 6 times to complete a task. This is basically an **Iterative or Loop structure**.



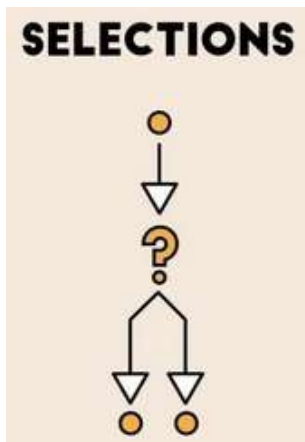
Definitions – Now that we understand these control structures.

Let us look into the definitions

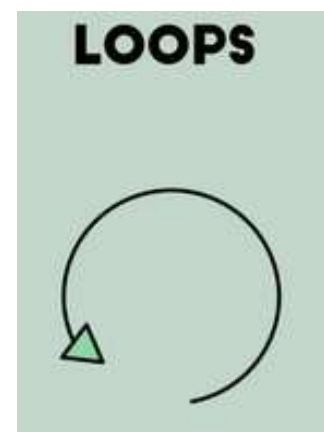
Sequence Structure – A sequence is a series of actions that are completed in a specific order. Action 1 is performed then Action 2 and then Action 3 and so on. This process continues until all the actions in a sequence are carried out.



Conditional (Selection) Structure – Selection structure is bit different. Instead of following one predefined order, the flow is defined by the output of a condition. In other words if condition A is met then take Path 1, but if condition A is not met then take Path 2.



Loop (Iteration) Structure – In this structure also the flow is defined by the output of a condition. However the difference is that the condition is asked over and over and over again until a certain task is complete. In other words a certain task will be executed as long as a condition is TRUE.



Carefully read the below paragraph and identify the **Sequences, Iterations and Selections**.

Sachin's daily morning routine:

- He gets up 6 in the morning every day.
- After getting up, he brushes his teeth.
- After brushing he usually drinks 2 glasses of warm water.
 - This involves putting 2 glasses of normal water in the container and then heating it on the stove.
 - Sachin regularly checks the temperature of water to ensure that it is not too warm to drink.
 - Once the water is warm enough to drink, he transfers it into a glass.
 - Finally he drinks a glass of water. After finishing one glass he again transfers the water from a container to a glass. He again drinks a glass of water.
- He then reads a news paper for 15 mins
- After reading news paper, he takes a shower.
- If it is not a Sunday, he wears a formal dress after shower.
- If it is a Sunday, he wears a casual dress.

Hint – Creating algorithm of above routine will help you to identify these structures

Use below table to write your findings about Sequence, Loops and Conditions from the last scenario. For now the order is not important but actions are.

Sequences	Iterations	Selections

Instant Quiz:

In a given Pseudocode, the algorithm below determines whether a given year is a leap year.

- If year is not divisible by 4, set leap_year to false
- Else if year is not divisible by 100, set leap_year to true
- Else if year is not divisible by 400, set leap_year to false
- Else, set leap_year to true.

Which among the following is correct. Tick on it ?

(A)

year	leap_year
1900	false
1984	true
2000	false
2002	false

(B)

year	leap_year
1900	false
1984	true
2000	true
2002	false

(C)

year	leap_year
1900	true
1984	true
2000	false
2002	false

(D)

year	leap_year
1900	true
1984	true
2000	true
2002	false

You just **experienced** a **structure** where the **outcome** is defined by the **conditions**.

Very specifically **if-else-if** conditional structure. We will learn more about it.

Conditions

In our definition of Loop (Iterative) and Conditional (Selection) structure, we have talked about “Conditions”. But what are these and how it controls the flow of execution in algorithms.

What is a Condition? _____

Simply put – something that must happen (or be true) in order for something else to happen

Current condition defines the future outcome

In general context - In our day to day activities also, the outcome of one condition defines the future.

Finish your homework then you can go out and play

- In other words – You only get to play when you finish your homework.
- In other words – If you do not finish your homework, you will not get to play.

In this example

Finishing your homework is a **condition** that will decide whether you **get to play** or not.

In computer programming context – We have learnt Sequences i.e the flow of execution in a computer software program. This is where the programmers utilize the conditions to control and divert the execution flow.

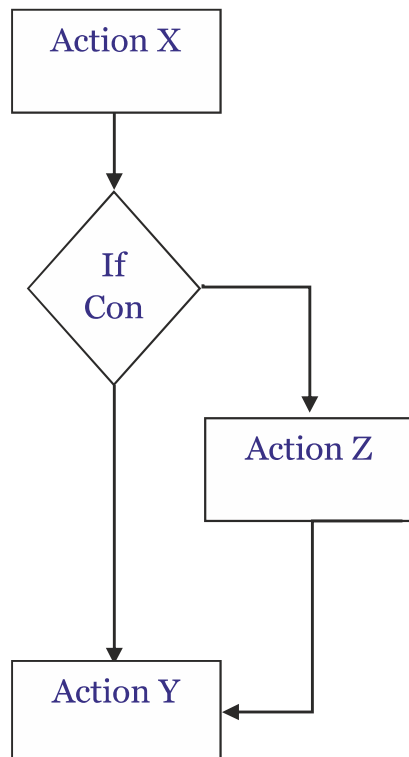
Enable Next option in iCodeT learning software only when the answer to current question is correct.



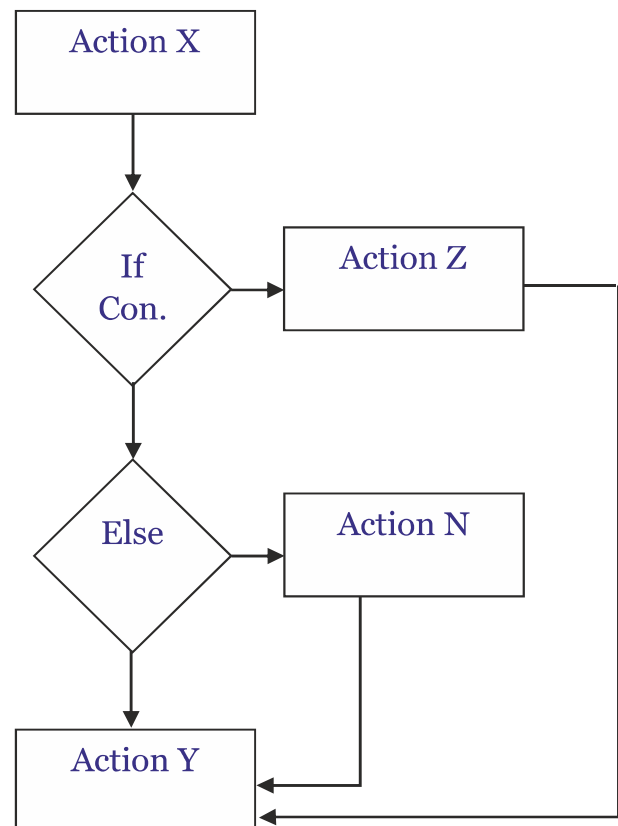
- In other words
If (Answer == Correct)
Then enable NEXT
Else
Keep it disabled

Conditions Type – While we have various ways to control the flow of execution. In this book, we will focus on three types of conditions

if



if .. else



if ... else if ... else (Nested)

