01

Repetition Structure

Types of Loops

Repetition Structure

(Loops)

Allows the **execution of a block of code repeatedly** as long as a specified **condition is true**.

1. **Entry Control Loop**
   - while loop
   - for loop

2. **Exit Control Loop**
   - do while loop

Repetition Structure

In any type of loops, following three essential parts must have to be included:

Initialization

Condition

Iteration

Increment

Decrement

++ --

Initialization

Initialization in a loop refers to **the process of setting an initial value** to the **loop control variable** before the loop starts executing.

The **loop control variable** is a variable that determines the **number of iterations** or the condition for the loop to continue.

```
int i = 1;
```

Condition

It is a loop is a **boolean expression** that **determines whether the loop should continue or terminate**.

It is **evaluated before each iteration** of the loop.

If the condition is true, the loop body is executed; if it is false, the loop is terminated, and program control moves to the next statement after the loop.

```
i <= 5
```

Iteration

Increment and decrement in a loop refer to **the operation of increasing or decreasing the loop control variable**.

These operations are typically part of the loop control statement and are **executed after each iteration** of the loop.

They are **used to update the loop control variable** and play a crucial role in determining when the loop should terminate.

Iteration (Increment/Decrement)

Increment and decrement can be done using three different approaches:

```
i = i + 1;
    or
i = i - 1;
```

Normal way

```
i += 1;
   or
i -= 1;
```

Shorthand syntax (using assignment operators)

```
i++;
 or
i--;
```

Using unary operator

Let's see **types of loops** in detail...

while loop

(Entry Controlled Loop)

```
Initialization
while (Condition)
{
   // Code to be executed if the condition is true
   // Increment / Decrement
}
```

do while loop

(Exit Controlled Loop)

```
Initialization
do
{
   // Code to be executed if the condition is true
   // Increment / Decrement
} while (Condition);
```

for loop

(Entry Controlled Loop)

```
for (Initialization; Condition; Iteration)
{
   // Code to be executed if the condition is true
}
```

TL;DR

Entry Controlled Loop

- The condition is checked before the execution of the loop block.
- The block of code is guaranteed to run only if the condition is true.
- I.e., while loop, and for loop

Exit Controlled Loop

- The condition is checked after the execution of the loop block.
- The block of code is guaranteed to run at least once.
- I.e., do while loop