DAY 15

1. What is a for Loop?

A **for loop** is a control flow statement that allows you to execute a block of code a specific number of times. It is ideal for situations where the number of iterations is known in advance. The loop neatly packages the initialization, condition check, and iteration steps into a single line, making your code clean and easy to follow.

- **Real-time use case:**
    - Iterating over an array of items to print each one.
    - Performing a calculation 100 times to simulate a process.
    - Displaying a list of search results to a user.

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2. Standard for Loop Syntax

A standard for loop has three main parts inside its parentheses, separated by semicolons:

1. **Initialization:** This runs once at the beginning of the loop to declare and initialize a counter variable.
2. **Condition:** This is a boolean expression checked before each iteration. If it's true, the loop continues; if it's false, the loop terminates.
3. **Iteration:** This runs at the end of each loop iteration, typically to increment or decrement the counter.

Java

```
for (initialization; condition; iteration) {
   // Code to be executed in each iteration
}
```

- **Code Example:**

Java

```
public class ForLoopExample {
   public static void main(String[] args) {
      // Loop from 0 to 4 (5 times)
      for (int i = 0; i < 5; i++) {
         System.out.println("The current number is: " + i);
      }
   }
```

```
}
// Output:
// The current number is: 0
// The current number is: 1
// The current number is: 2
// The current number is: 3
// The current number is: 4
```

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3. The Enhanced for Loop (for-each)

Java also provides an **enhanced for loop** (often called a for-each loop) as a simpler way to iterate through all elements of an array or collection. It removes the need for a counter variable, making the code more readable and less prone to off-by-one errors.

- **Real-time use case:**
    - Calculating the sum of all elements in a list.
    - Printing every customer's name from a collection.
- **Code Example:**

Java

```
public class ForEachLoopExample {
   public static void main(String[] args) {
      String[] fruits = {"Apple", "Banana", "Cherry"};

      // Loop through each element in the 'fruits' array
      for (String fruit : fruits) {
        System.out.println("I love " + fruit);
      }
   }
}
// Output:
// I love Apple
// I love Banana
```

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// I love Cherry

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4. Interview Questions on for Loops

1. **What is a for loop, and when is it the best choice to use?**
    - **Answer:** A for loop is a loop that repeats a specific number of times. It's best used when the number of iterations is known beforehand.
2. **Explain the three parts of a standard for loop.**
    - **Answer:**
        1. **Initialization:** Declares and sets up a counter.
        2. **Condition:** The test that must be true for the loop to continue.
        3. **Iteration:** The step that changes the counter's value.
3. **What is the difference between a standard for loop and an enhanced for loop?**
    - **Answer:** A standard for loop uses an explicit counter variable (i) and is good for precise control over the loop. An enhanced for loop is a simpler syntax for iterating through all elements of an array or collection and does not provide an index.
4. **What is an infinite for loop? How would you create one?**
    - **Answer:** An infinite loop is one that never terminates. You can create one by omitting the condition, like for (;;).
5. **When would you choose a while loop over a for loop?**
    - **Answer:** You would choose a while loop when the number of iterations is not known in advance, and the loop depends on a condition that may change inside the loop body.