6.9-Which loop to use

Recommended Loops to Use in Programs

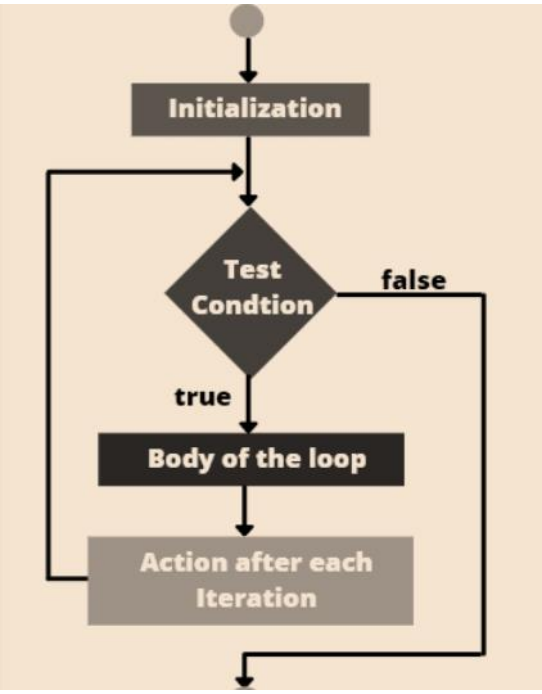
In Java, there are three primary loops that we use to perform iterations:

1. **while loop**
2. **do-while loop**
3. **for loop**

Each of these loops is useful in different scenarios, depending on the conditions and requirements of the task at hand. While all loops perform iterations, the choice of which loop to use depends on the specific situation. Let's break it down:

1. for Loop

- **When to use:**
  A for loop is ideal when **you know the exact number of iterations** in advance. It combines the initialization, condition checking, and increment/decrement in one statement, making it concise and clear.
- **Common usage:**
  For tasks like counting, iterating over arrays or lists, or performing a set number of iterations, the for loop is highly recommended.

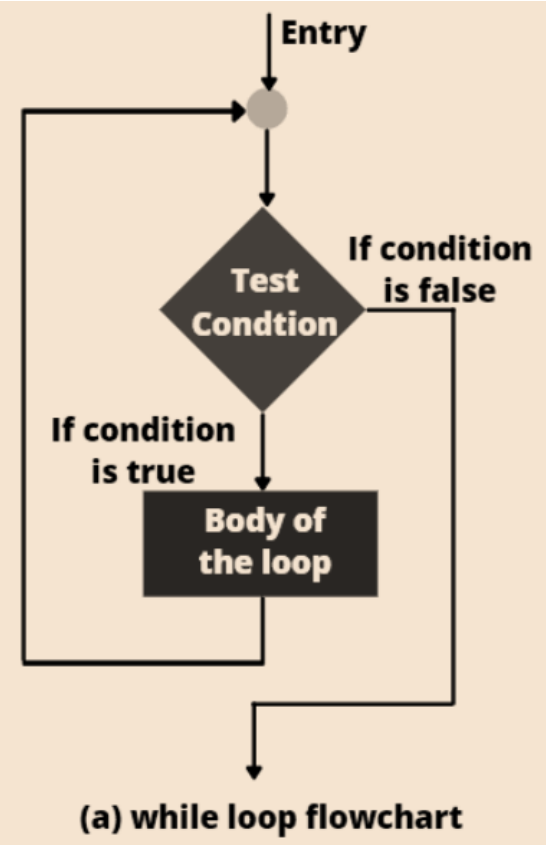


- **Example:**

```java
for (int i = 0; i < 5; i++) {
    System.out.println("Iteration: " + i);
}
```

2. while Loop

- **When to use:**
  A while loop is preferred when **you don't know in advance how many iterations** are needed, but the condition will determine when the loop should terminate. This is common in scenarios like reading from a file, where the number of iterations depends on external factors (e.g., the content of the file).
- **Analogy:**
  Think of it as **"As long as"** – as long as the condition holds true, the loop will keep running.



(a) while loop flowchart

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- **Example:**

```
while (file.hasNextLine()) {
    String line = file.nextLine();
    System.out.println(line);
}
```

3. do-while Loop

- **When to use:**
  A do-while loop is useful when you **need to execute the loop at least once**, even if the condition is initially false. This is because the condition is checked after the first iteration.

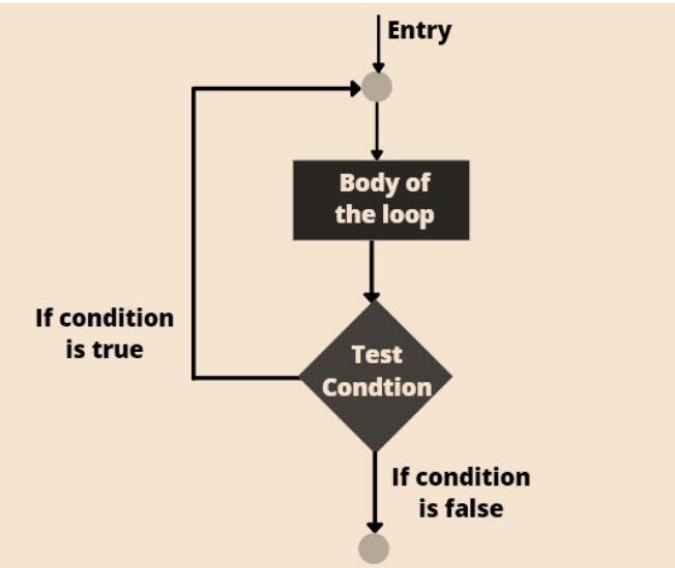

Fig: do while loop flowchart

- **Example:**

```java
int count = 0;
do {
    System.out.println("Iteration: " + count);
    count++;
} while (count < 5);
```

Choosing the Right Loop

- **Use a for loop** when you know the exact number of iterations.
- **Use a while loop** when the number of iterations is unknown and depends on a condition being met (e.g., reading a file or fetching data from a database).
- **Use a do-while loop** when you want the loop to run at least once, regardless of the condition.

Real-World Usage

- In **enterprise-level applications**, while loops are often used for tasks like fetching data from a database, reading files, or processing user input. These tasks usually require loops that continue until a condition (e.g., end of file or no more data) is met.
- Although **all loops perform the same function** (i.e., iteration), choosing the right loop enhances code readability and efficiency. In practice, for loops are commonly used when the number of iterations is clear, while while loops are favored for data-driven operations.