Module 2: Looping Constructs and Arrays

Premanand S

Assistant Professor
School of Electronics Engineering (SENSE)
Vellore Institute of Technology
Chennai Campus

premanand.s@vit.ac.in

January 22, 2025

Topics covered in Module 2,

- Control looping and Constructs
- Arrays
- One-dimensional arrays
- Multi-dimensional arrays
- Enhanced for loop
- Strings
- Wrapper classes

Simulate a Login Attempt

Write a program that allows the user to enter a password.

- The user gets a maximum of 3 attempts to enter the correct password.
- Use a `while` loop to validate the password.
- If the user enters the wrong password 3 times, display `Access Denied`.

Countdown Timer

Create a program that acts as a countdown timer from 10 to 0.

- Use a `do-while` loop to display the numbers.
- Print `Blast Off!` when the countdown reaches zero.

Calculate Compound Interest

Write a program to calculate the total amount of an investment over time.

- Input: Principal, interest rate, and number of years.
- Use a `while` loop to calculate the amount for each year.

Guess the Secret Number

Create a guessing game where the user tries to guess a secret number between 1 and 100.

- Use a `do-while` loop to continue until the user guesses correctly.
- Provide hints (`Too high` or `Too low`) for incorrect guesses.

Menu-Driven Program

Design a program with a menu for basic mathematical operations (Addition, Subtraction, Multiplication, Division).

- Use a `do-while` loop to allow the user to perform multiple operations until they choose to exit.

Infinite Loops

What happens if you forget to update the condition variable in a `while` loop?

- Write an example where this happens.
- Fix the example to avoid the infinite loop.

Palindrome Check

Write a program to check if a given number is a palindrome (e.g., 121, 1221).

- Use a `while` loop to reverse the number and compare it with the original.

Sum of Digits

Write a program to calculate the sum of the digits of a number (e.g., for 1234, the sum is 10).

- Use a `while` loop to extract and sum the digits.

Validate User Input

Create a program that asks the user to input a positive number.

- If the input is negative or zero, keep asking until a valid number is entered.
- Use a `do-while` loop.

Question: Pattern Printing

Print the following pattern using nested `while` loops:

Example (Understanding)

```
1
22
333
4444
```

Prime Numbers in a Range

Write a program to find all prime numbers between 1 and 50.

- Use a `while` loop to iterate through the numbers.
- Use another loop to check divisibility.

Factorial Calculation

Write a program to calculate the factorial of a number using a `while` loop.

- Test it with edge cases like 0 and 1.

Fibonacci Sequence

Generate the first `n` numbers in the Fibonacci sequence using a `do-while` loop.

- Input: Number of terms (e.g., `n = 7` $\rightarrow$ Output: 0, 1, 1, 2, 3, 5, 8).

Sum of Even Numbers

Calculate the sum of even numbers between 1 and 100 using a `while` loop.

Digital Root

Write a program to find the digital root of a number (e.g., for 942, the digital root is 9).

- Use a `while` loop to repeatedly sum the digits until the result is a single digit.