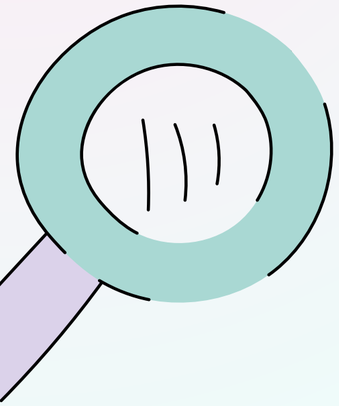
WEEKLY PRACTICE SESSION
C++ BASICS & PROBLEM SOLVING

AGENDA

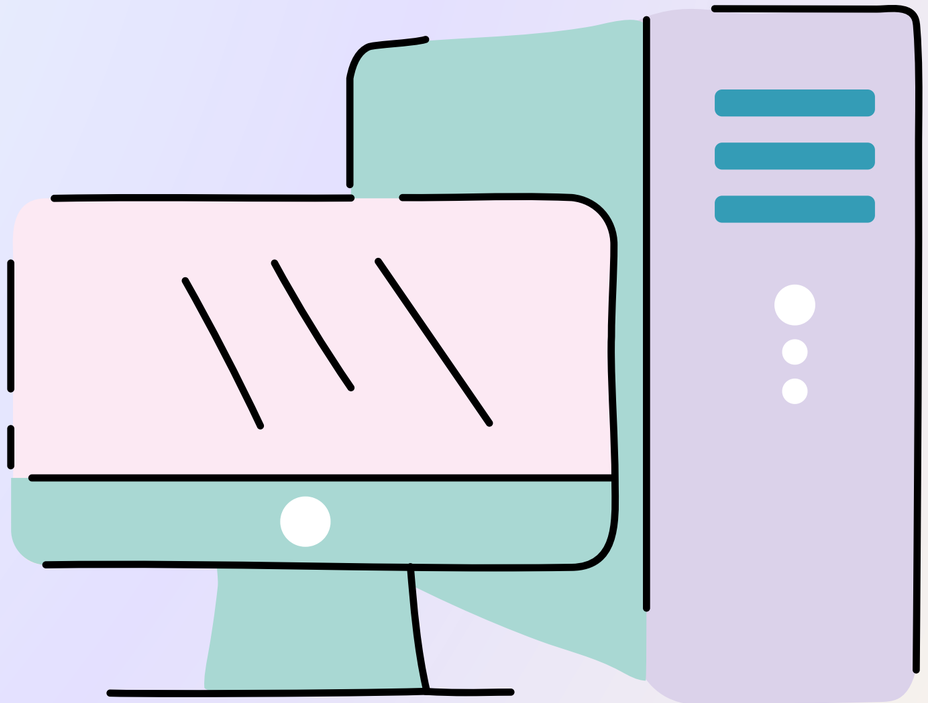
- Quick overview of weekly topics
- Practice questions (Easy → Medium → Hard)
- Problem-solving mindset

Introduction to C++ (Overview)



What is C++?

- C++ is a general-purpose programming language
- **It supports:**
  - Procedural programming
  - Object-Oriented Programming (OOP)
- **Widely used in:**
  - Competitive programming
  - System software
  - Game development



Key Concepts:

- Variables & data types (int, char, float, string)
- Input / Output (cin, cout)
- Operators (<, <=, >, >=, ==, !=, ||, &&)
- Control statements (if, else, loops)

Basic C++ Syntax – Quick Reference

Include & Namespace

```
#include <iostream>
using namespace std;
```

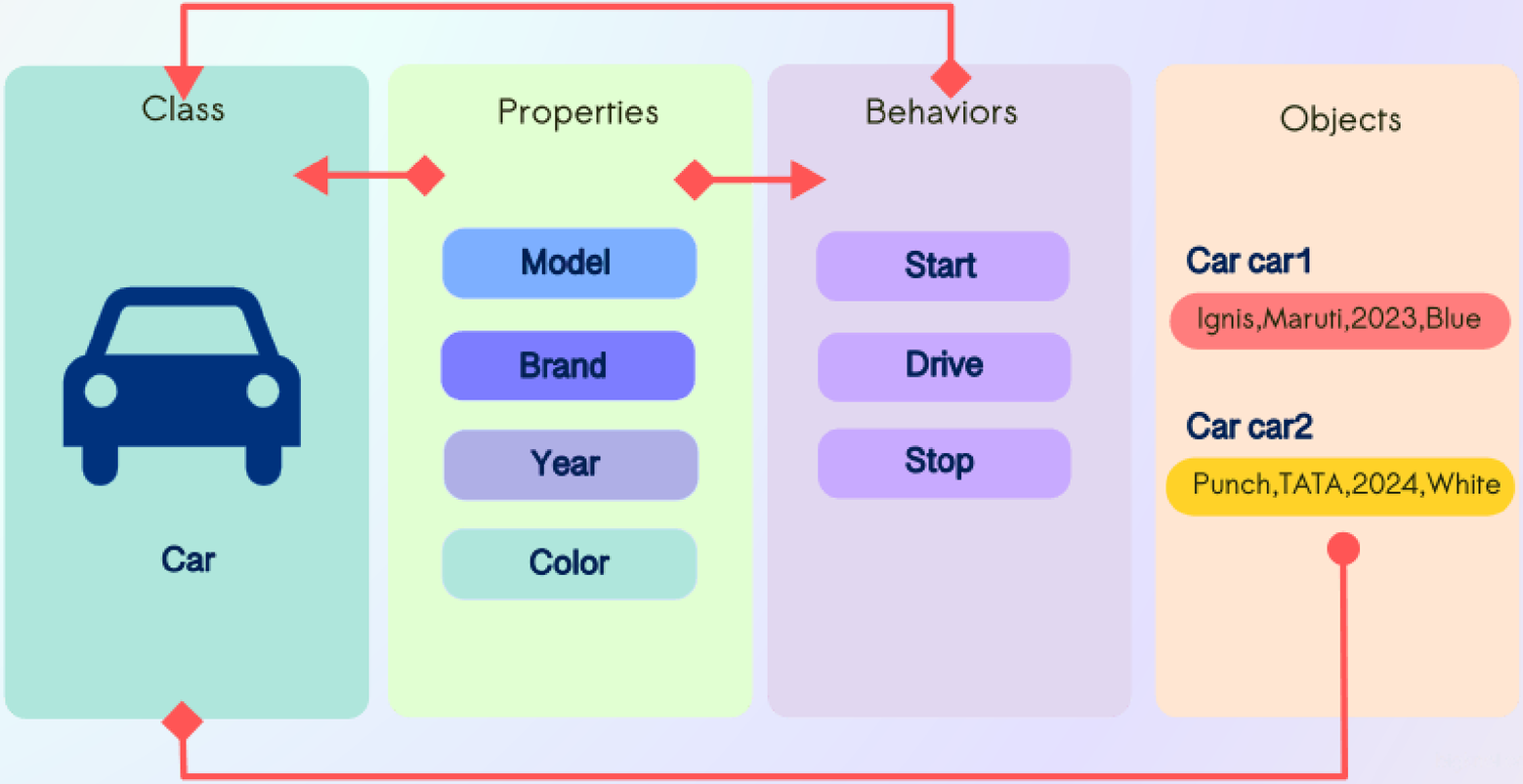
Input & Output

```
cin >> n;
cout << "Sum is: " << sum;
```

Input & Output (without using namespace std)

```
std::cin >> n;
std::cout << "Sum is: " << sum;
```

Classes and Objects



Simple code for understanding

```
#include <iostream.h>
 Class student
 {
   public:
                int    Rollno.;
                str  Name;
                int    age;
                int showage()                          {
                       cout<<" The age is:"<<age;
                   }};


int main() {
 student std1;
 std1.Rollno . = 5;
 std1.Name = "Aman";
 std1.age=22;
 std.showage();
return 0 ;
}
```

Object creation

Assigning values to variables using object std1

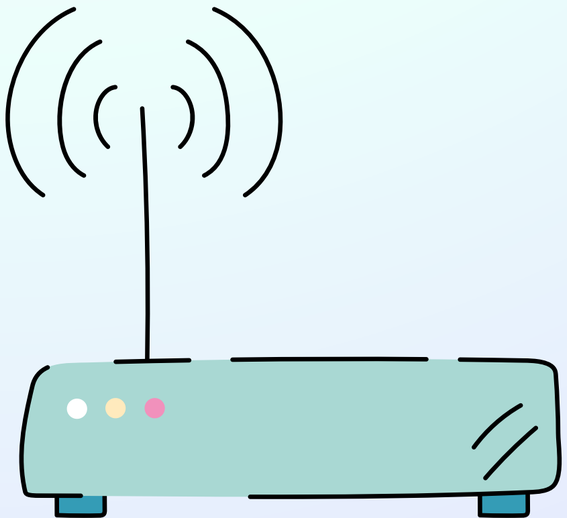
Assigning value to member function using object std1

Practice Questions – Introduction to C++

MEDIUM

Write a program that takes a number as input and checks whether it is even or odd.

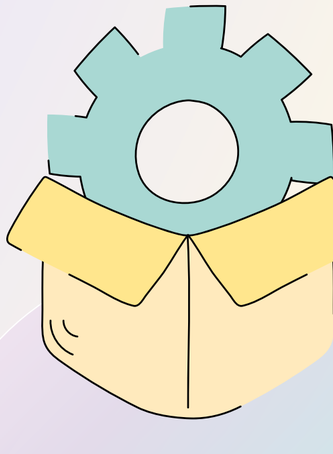
```
#include <iostream>
using namespace std;

int main() {
    int n;
    cin >> n;

    if(n % 2 == 0)
        cout << "Even";
    else
        cout << "Odd";

    return 0;
}
```



HARD

Write a program that takes a number n and prints all prime numbers from 1 to n.

```
#include <iostream>
using namespace std;

int main() {
    int n;
    cin >> n;

    for(int i = 2; i <= n; i++) {
        bool isPrime = true;

        for(int j = 2; j < i; j++) {
            if(i % j == 0) {
                isPrime = false;
                break;
            }
        }

        if(isPrime)
            cout << i << " ";
    }

    return 0;
}
```



Functions in C++ (Overview)

What is a Function?

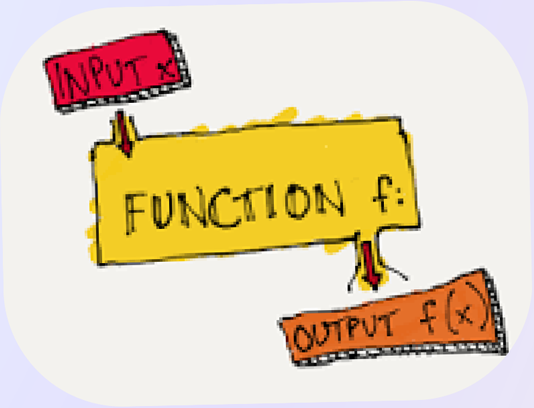
- A function is a block of code that performs a specific task.

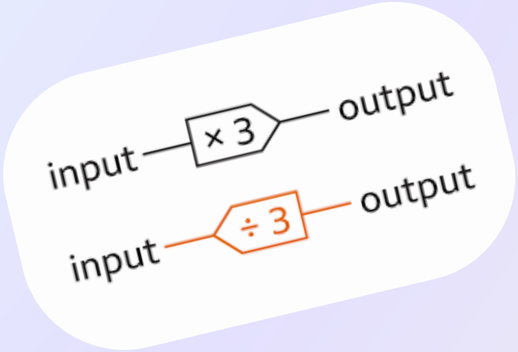
Helps in:

- Code reusability
- Better readability
- Easier debugging

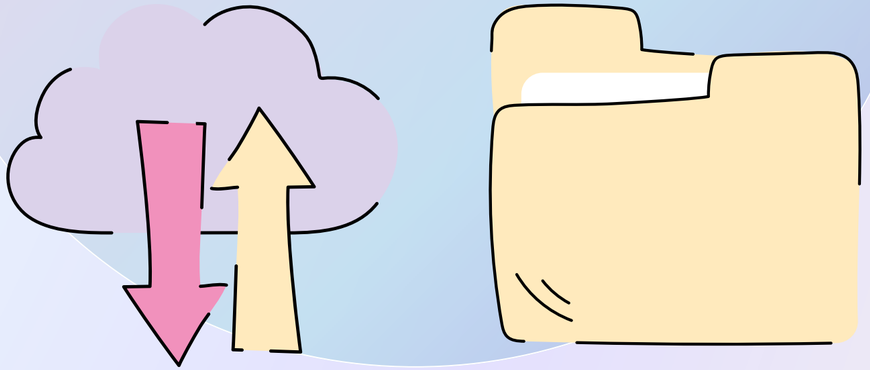
Types of Functions:

- Built-in functions (e.g., sqrt(), pow())
- User-defined functions





Practice Questions – Functions

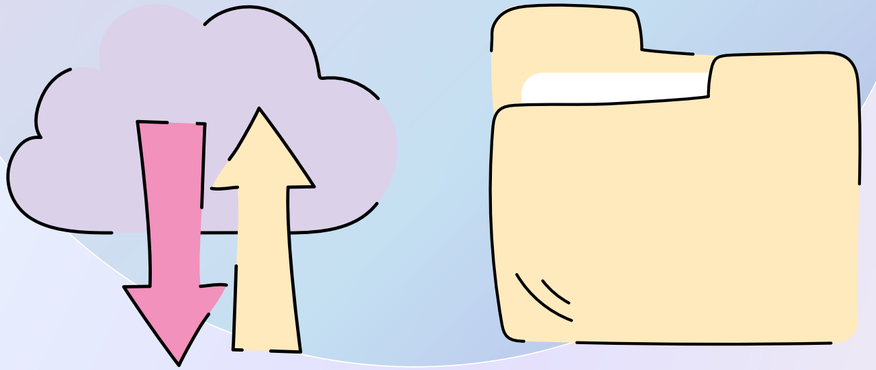


Write a function that checks whether a given number is a palindrome.

```
#include <iostream>
using namespace std;

bool isPalindrome(int n) {
  int original = n;
  int reverse = 0;

  while(n > 0) {
    reverse = reverse * 10 + (n % 10);
    n = n / 10;
  }

  return (original == reverse);
}

int main() {
 int num;
 cin >> num;

 if(isPalindrome(num))
 cout << "Palindrome";
 else
 cout << "Not Palindrome";

 return 0;
}
```

Write a function that calculates factorial of a number using recursion.

```
#include <iostream>
using namespace std;

int factorial(int n) {
  if(n == 0 || n == 1)
    return 1;
  else
    return n * factorial(n - 1);
}

int main() {
  int num;
  cin >> num;

  cout << factorial(num);

  return 0;
}
```



UML Diagrams

UML Class Diagram (Short Theory)

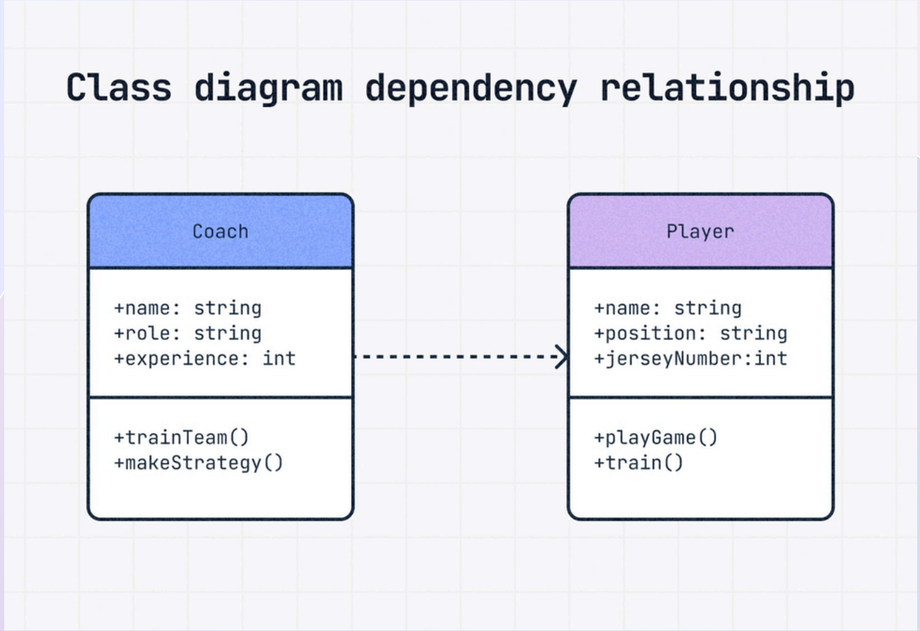
A UML Class Diagram is a structural diagram used to represent the static structure of an object-oriented system. It shows classes, their attributes, methods, and the relationships between classes.

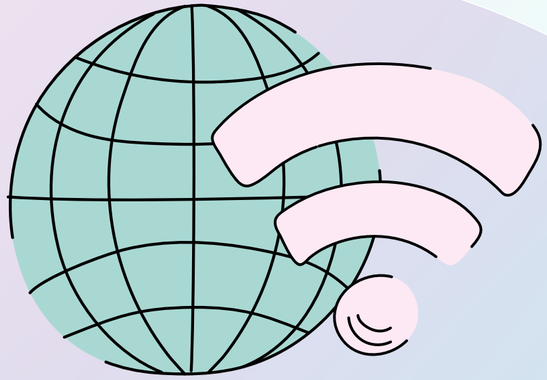
Each class is represented by a rectangle divided into three parts:

Class Name, Attributes, and Methods.

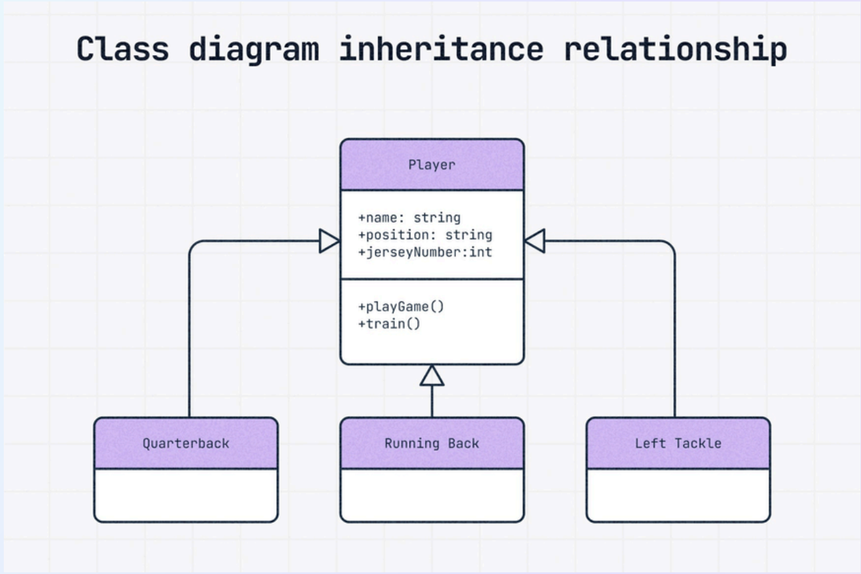
Relationships such as association, inheritance, aggregation, and composition describe how classes interact with each other.

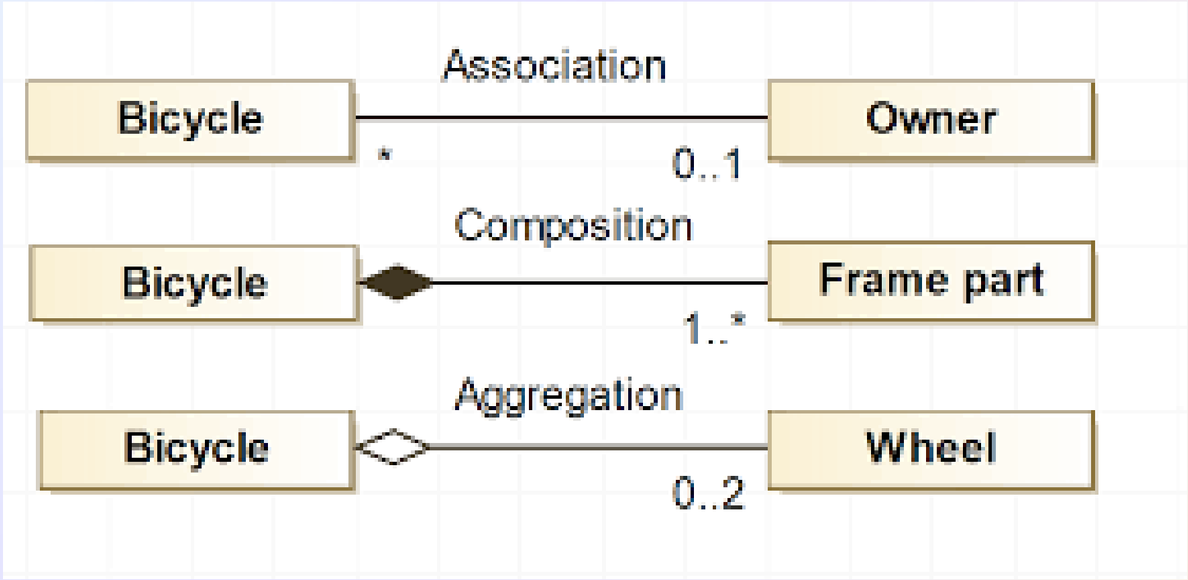
UML class diagrams are used to design systems before coding, improve understanding, and clearly visualize object-oriented concepts.

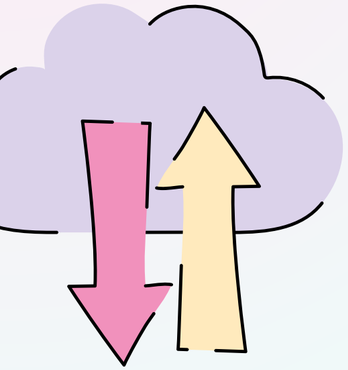




Inheritance
Association
Compsition
Aggregation







Thank You