Vikram
@code._learning

C++ References

References are an alternative to pointers that provide a way to create aliases for variables. They are easier to use and safer compared to pointers.

Reference Variables

A reference variable is an alias for another variable. Once a reference is initialized to a variable, it cannot be changed to refer to another variable.

Declaration and Initialization

```cpp
int a = 10;
int& ref = a;  // ref is a reference to a

cout << "Value of a: " << a << endl;
cout << "Value of ref: " << ref << endl;

ref = 20;  // Changing ref also changes a
cout << "New value of a: " << a << endl;  // Output: 20
```

Passing by Reference

Passing arguments by reference allows functions to modify the arguments passed to them. It also avoids the overhead of copying large objects.

Function with Reference Parameters

```cpp
void increment(int& num) {
    num++;
}

int main() {
    int a = 5;
    increment(a);
    cout << "Value of a after increment: " << a << endl;  // Output: 6
    return 0;
}
```

Returning by Reference

Functions can return references, allowing the function to provide direct access to variables defined outside the function scope.

Function Returning a Reference

```cpp
int& findMax(int& x, int& y) {
    return (x > y) ? x : y;
}

int main() {
    int a = 10;
    int b = 20;
    int& max = findMax(a, b);

    cout << "Max value: " << max << endl;  // Output: 20

    max = 30;  // Changing the max reference changes the original variable
    cout << "New value of b: " << b << endl;  // Output: 30

    return 0;
}
```