Tutorial 38 - Single Inheritance in C++: A Deep Dive

Definition:

- Single inheritance involves one **base class** and one **derived class**.
- The derived class inherits properties and methods of the base class.

Code Example

Code Snippet 1: Base Class

```cpp
class Base {
    int data1; // Private by default, not inheritable
public:
    int data2;
    void setData();
    int getData1();
    int getData2();
};
void Base::setData() {
    data1 = 10;
    data2 = 20;
}
int Base::getData1() {
    return data1;
}
int Base::getData2() {
    return data2;
}

```

Explanation:

1. **Private Member**: `data1` (not inherited).
2. **Public Member**: `data2` (inherited).
3. **Member Functions**:
   - `setData()`: Sets `data1 = 10` and `data2 = 20`.
   - `getData1()`: Returns `data1`.
   - `getData2()`: Returns `data2`.

Code Snippet 2: Derived Class

```cpp
class Derived : public Base { // Public inheritance
    int data3; // Private member
public:
    void process();
    void display();
};
void Derived::process() {
    data3 = data2 * getData1(); // Uses base class members
}
void Derived::display() {
    cout << "Value of data1: " << getData1() << endl;
    cout << "Value of data2: " << data2 << endl;
    cout << "Value of data3: " << data3 << endl;
}

```

Explanation:

1. **Derived Class**:
   - Inherits `Base` publicly.
   - Adds private member `data3`.
2. **Member Functions**:
   - `process()`: Multiplies `data1` and `data2`, stores result in `data3`.
   - `display()`: Prints `data1`, `data2`, and `data3`.

Code Snippet 3: Main Program

```
int main() {
    Derived der;     // Create derived class object
    der.setData();   // Set values of data1 and data2
    der.process();   // Compute data3
    der.display();   // Display all values
    return 0;
}

```

Key Observations

1. **Inheritance**:
   - `data1`: Private → Not inherited.
   - `data2`: Public → Inherited as public.
2. **Access Control**:
   - Private members of the base class can only be accessed through public member functions.
3. **Execution Flow**:
   - `setData()` initializes base class members.
   - `process()` calculates `data3` using base class members.
   - `display()` outputs all relevant values.

Short Notes for Notebook

Single Inheritance

1. One base class and one derived class.
2. Base class members:
   - **Private**: Not inherited.
   - **Public**: Inherited (access depends on visibility mode).

Base Class Code

```
class Base {
    int data1; // Not inherited
public:
    int data2; // Inherited
    void setData(); // Initializes data
    int getData1(); // Returns data1
    int getData2(); // Returns data2
};

```

Derived Class Code

```
class Derived : public Base {
    int data3; // Private member
public:
    void process(); // Calculates data3
    void display(); // Prints data1, data2, data3
};

```

Main Program

```
int main() {
    Derived obj;
    obj.setData();  // Initialize data
    obj.process();  // Calculate data3
    obj.display();  // Display values
}

```

Output

```
Value of data1: 10
Value of data2: 20
Value of data3: 200
```