Agenda

- Revison
- Association.
  - composition
  - aggegration
- Inheritance.
  - Ctor call
  - types of inheritance
  - mode of inheritance
- Diamond Problem
- ~~upcasting & downcassting~~
- ~~Object Slicing~~

Hirerachy

-     1. has-a relationship
  - Association
-     2. is-a relationship

Association

- If has-a relation ship exits between 2 entities/classes then we use association
- eg - Human has-a heart
  - Car has-a engine
  - Department has-a faculty
- Dependency Object - Heart
- Dependent Object - Human
- Their are two types of association
-     1. Composition
  - tight coupling
-     2. Aggegration
  - loose coupling

Composition (demo01)

- Employee has-a DateOfJoining
- Employee - Dependent
- Date - Dependency

Aggegration (demo02 and demo03)

- Employee has-a Vehicle

Inheritance (demo04)

- If is-a Relationship exists between two entities/classes we use inheritance

- eg

    - Employee is-a person
    - Car is-a vehicle
    - Apple is-a fruit
    - Mobile is-a device
    - circle is-a shape

- Base/Parent class

- Derived/Child class

- to have inheritance we will follow the below syntax

```cpp
class Person // Base-> Parent
{
public:
    Person()
    {
        cout << "Person Ctor" << endl;
    }
};

class Employee : Person //Inheritance (Employee( Derived )-> child)
{
public:
    Employee()
    {
        cout << "Employee Ctor" << endl;
    }
};
```

- When we cretae object of the derived class then all the non static data members gets space inside the derived classs object.
- At the time of derived class object creation the parent/base class constructor gets called first and then the derived class ctor gets called.

Types of inheritance

- 1. Single Inheritance
- 2. Multilevel Inheritance
- 3. Multiple Inheritance

- 4. Hirereachical Inheritance
- 5. Hybrid Inheritance

Protected data member (demo05)

- these data members are not accessiable outside the class on class object, however they are accessible directly inside the derived class

Mode of inheritance (demo06)

- if we use the private,public and protected keywords at the time of inheritance then we call it as mode of inheritance
- default mode of inheritance is private.

Diamond Problem (demo07)

- when hybrid inheritance occurs, the base class members gets inherited multiple times inside the indirect derived classes.
- this multiples inheritance of the members is called as diamond problem.
- to resolve this multiple inclusions we have to make the base class as virtual at the time of inheritance.