Lab 3- Function Overloading and Overriding

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Roll Number - SE20UCSE040

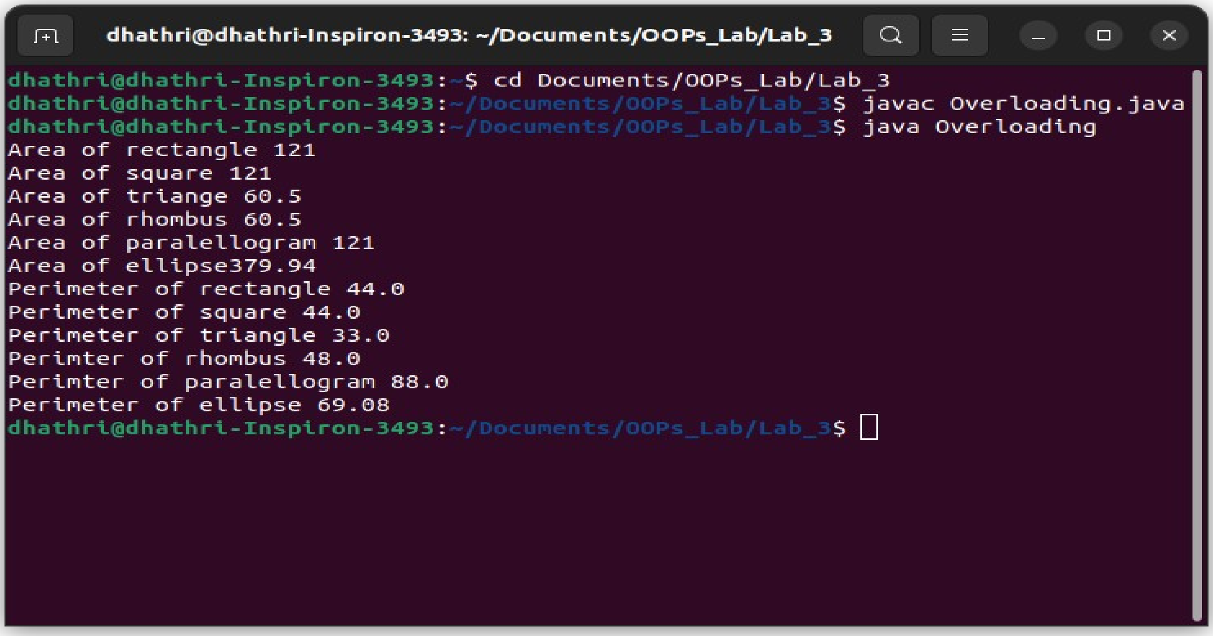
Q1. Program to perform method Overloading-

Create a program to have method overloaded to find following parameters related to different geometric shapes (Square, rectangle, triangle, rhombus, parallelogram, ellipse)
Area
Perimeter

Code-

```
import java.lang.Math;
class Method1{
static int area(int a, int b){
int area1 = a * b;//Rectangle
return area1;
}
static int area(int a){
int area2 = a * a;//Square
return area2;
}
static double area(int b, int h, double some){
double area3 = b * h * some;//Triangle
return area3;
}
static double area(int d1, int d2, double some1, int temp){
double area4 = d1 * d2 * some1;//Rhombus
return area4;
}
static int area(int base, int height, int temp1, int temp2, int temp3){
int area5 = base * height;//Parallelogram
return area5;
}
static double area(float base, int height, double some3, int temp4, int temp5, int temp6){
double area6 = some3 * base * height;//ellipse
return area6;
}
static float perimeter(int a, int b){
float per1 = 2 * (a + b);//Rectangle
return per1;
}
static float perimeter(int a){
float per2 = 4 * a;//Square
return per2;
}
static float perimeter(int a, int b, int c){
float per3 = a + b + c;//Triangle
return per3;
}
static float perimeter(int a, int temp, int temp2, int temp3){
float per4 = 4*a;//Rhombus
return per4;
}
static float perimeter(int a, int b, int temp4, int temp5, int temp6){
float per5 = 4*(a + b);//Paralellogram
return per5;
}
static double perimeter(int a, int b, int temp7, int temp8, int temp9, int temp10){
double per6 = 2*3.14*Math.sqrt((Math.pow(a,2) + Math.pow(b,2))/2);//ellipse
return per6;
}
}
class Overloading{
public static void main(String[] args){
Method1 M1 = new Method1();
System.out.println("Area of rectangle " + M1.area(11,11));
System.out.println("Area of square " + M1.area(11));
System.out.println("Area of triange " + M1.area(11,11,0.5));
System.out.println("Area of rhombus " + M1.area(11,11,0.5,1));
System.out.println("Area of paralellogram " + M1.area(11,11,1,1,1));
System.out.println("Area of ellipse" + M1.area(11,11,3.14,1,1,1));
System.out.println("Perimeter of rectangle " + M1.perimeter(11,11));
System.out.println("Perimeter of square " + M1.perimeter(11));
System.out.println("Perimeter of triangle " + M1.perimeter(11,11,11));
System.out.println("Perimter of rhombus " + M1.perimeter(11,1,1,1,1));
System.out.println("Perimter of paralellogram " + M1.perimeter(11,11,1,1,1));
System.out.println("Perimeter of ellipse " + M1.perimeter(11,11,1,1,1,1));
}
}
```

Output-



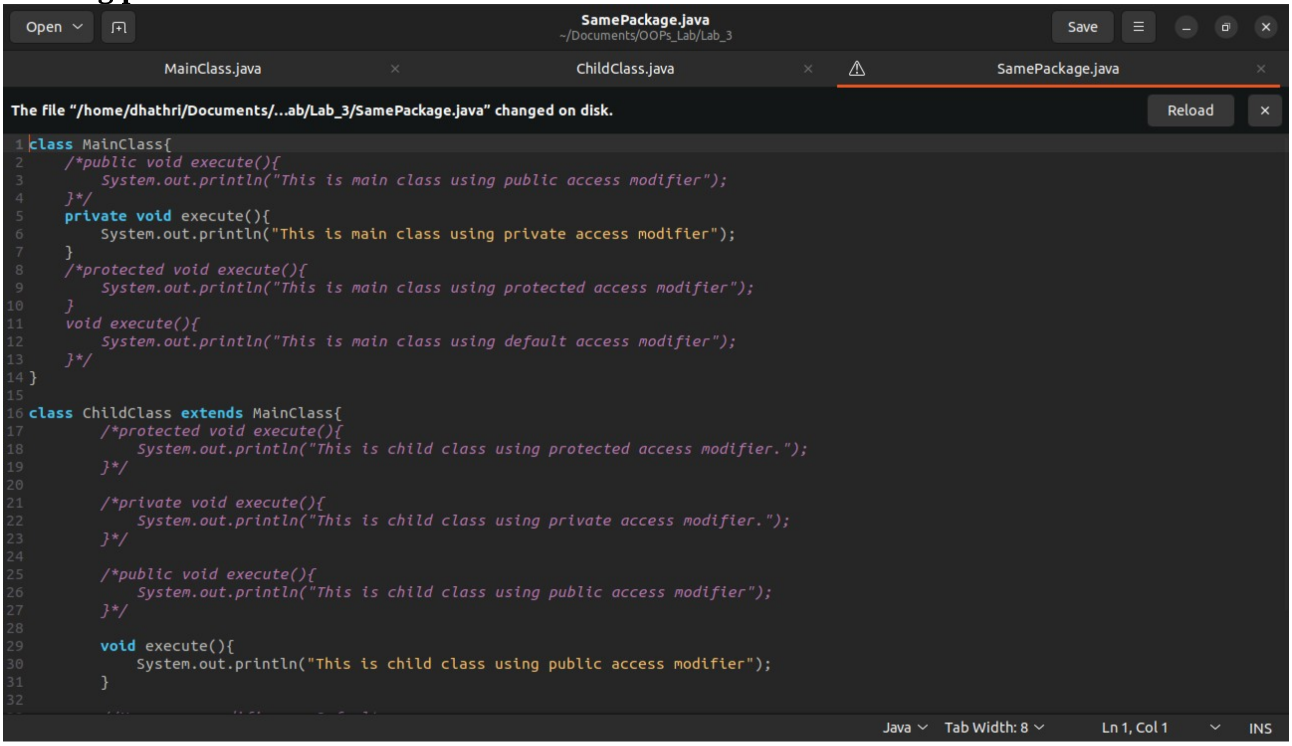
```
dhathri@dhathri-Inspiron-3493:~$ cd Documents/OOPs_Lab/Lab_3
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac Overloading.java
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ java Overloading
Area of rectangle 121
Area of square 121
Area of triange 60.5
Area of rhombus 60.5
Area of paralellogram 121
Area of ellipse379.94
Perimeter of rectangle 44.0
Perimeter of square 44.0
Perimeter of triangle 33.0
Perimter of rhombus 48.0
Perimter of paralellogram 88.0
Perimeter of ellipse 69.08
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

Q2. Programs to perform method Overriding

Create java code in different packages and try to override the method defined in parent class. The parent class should be in one package and the child class can be in same or different package.

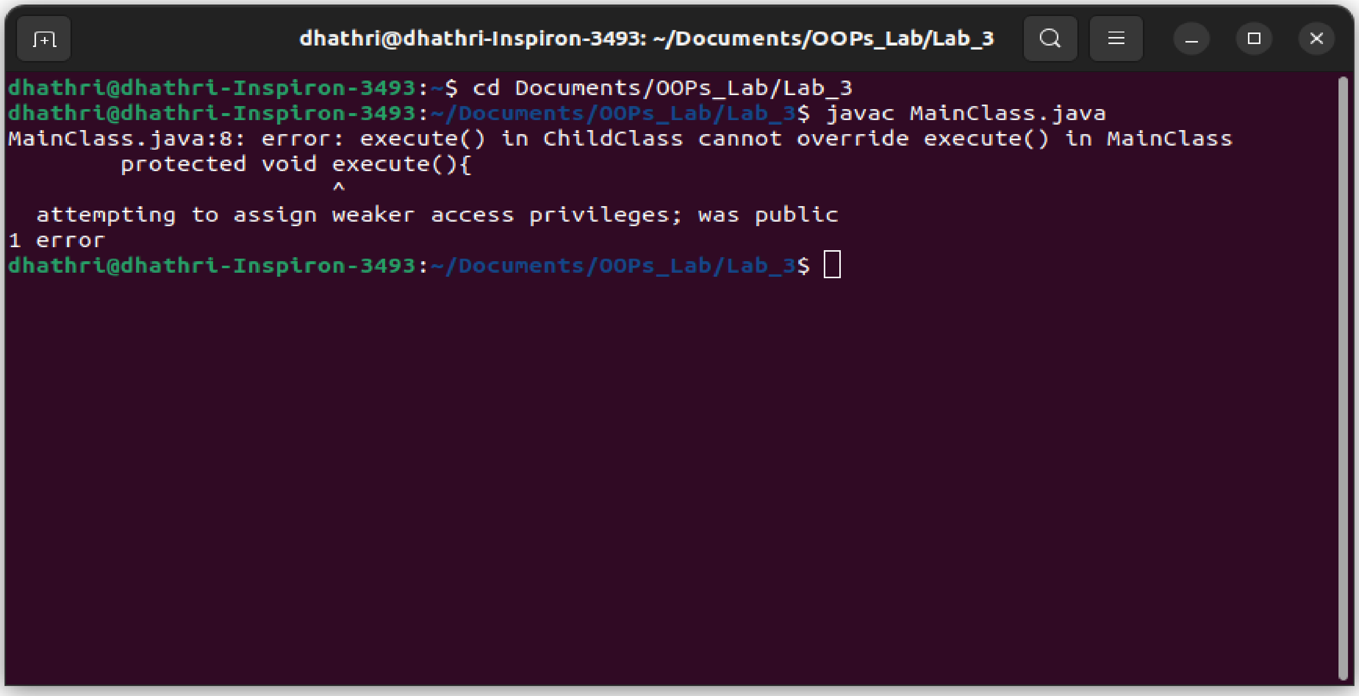
Perform the same task using different access modifier.

In the same package-
1. Using protected access modifier



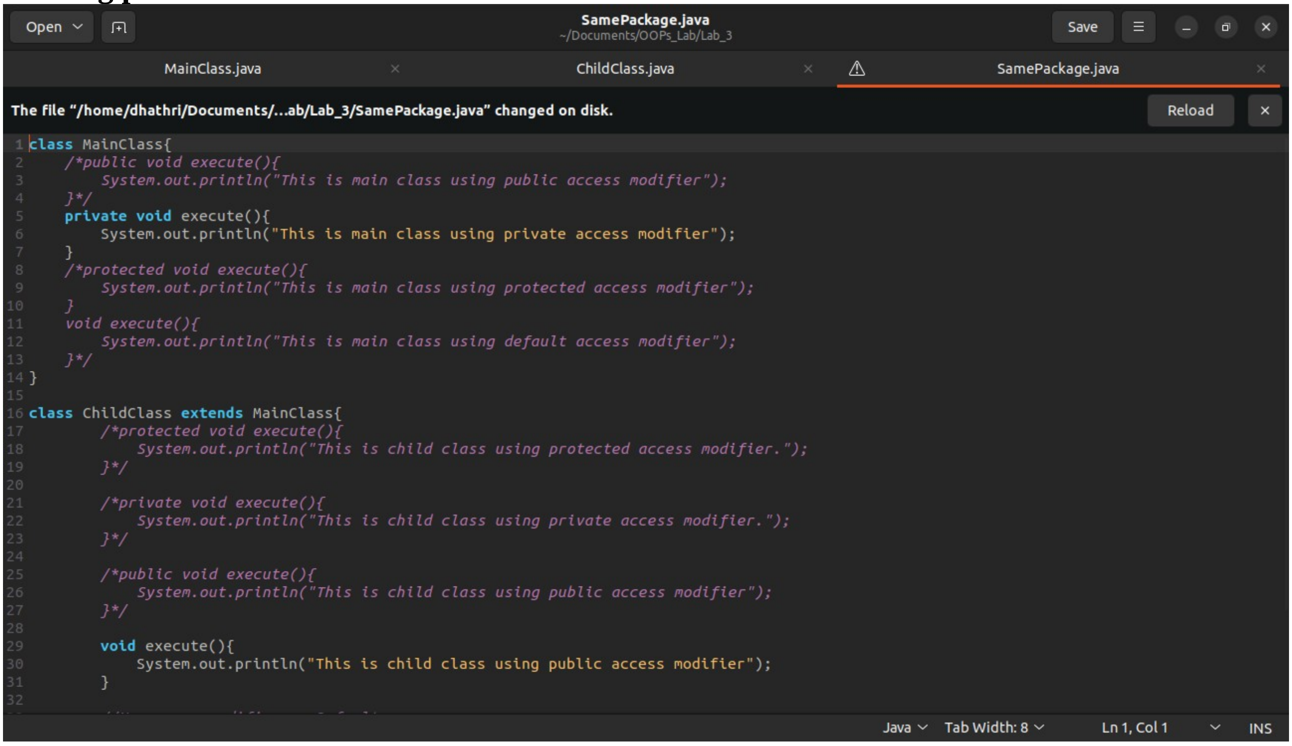
The file "/home/dhathri/Documents/...ab/Lab_3/SamePackage.java" changed on disk.

```
class MainClass{
    /*public void execute(){
        System.out.println("This is main class using public access modifier");
    }*/
    private void execute(){
        System.out.println("This is main class using private access modifier");
    }
    /*protected void execute(){
        System.out.println("This is main class using protected access modifier");
    }
    void execute(){
        System.out.println("This is main class using default access modifier");
    }*/
}

class ChildClass extends MainClass{
        /*protected void execute(){
            System.out.println("This is child class using protected access modifier.");
        }*/

        /*private void execute(){
            System.out.println("This is child class using private access modifier.");
        }*/

        /*public void execute(){
            System.out.println("This is child class using public access modifier");
        }*/

        void execute(){
            System.out.println("This is child class using public access modifier");
        }

```



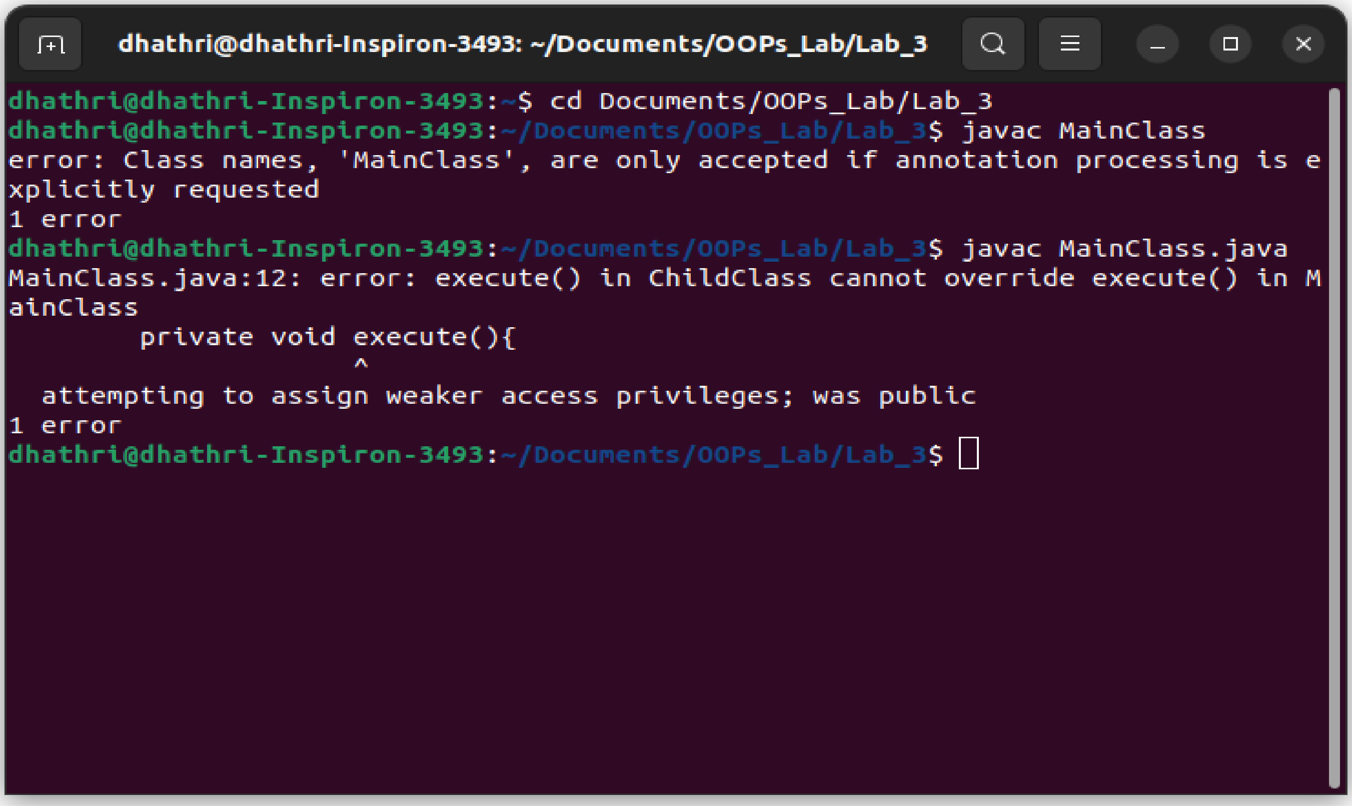
```
dhathri@dhathri-Inspiron-3493:~$ cd Documents/OOPs_Lab/Lab_3
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac MainClass.java
MainClass.java:8: error: execute() in ChildClass cannot override execute() in MainClass
        protected void execute(){
                       ^
  attempting to assign weaker access privileges; was public
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

2. Using private access modifier



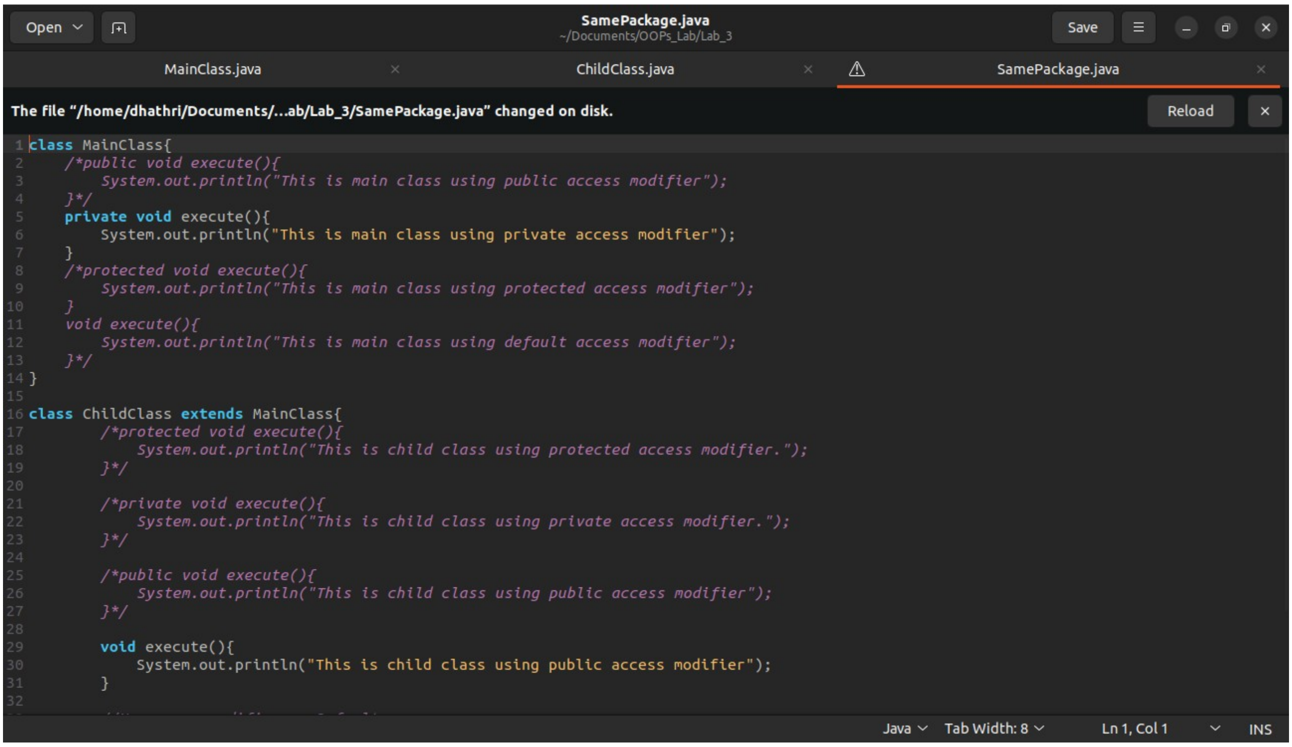
The file “/home/dhathri/Documents/...ab/Lab_3/SamePackage.java” changed on disk.

```java
class MainClass{
    /*public void execute(){
        System.out.println("This is main class using public access modifier");
    }*/
    private void execute(){
        System.out.println("This is main class using private access modifier");
    }
    /*protected void execute(){
        System.out.println("This is main class using protected access modifier");
    }
    void execute(){
        System.out.println("This is main class using default access modifier");
    }*/
}

class ChildClass extends MainClass{
        /*protected void execute(){
            System.out.println("This is child class using protected access modifier.");
        }*/

        /*private void execute(){
            System.out.println("This is child class using private access modifier.");
        }*/

        /*public void execute(){
            System.out.println("This is child class using public access modifier");
        }*/

        void execute(){
            System.out.println("This is child class using public access modifier");
        }

```



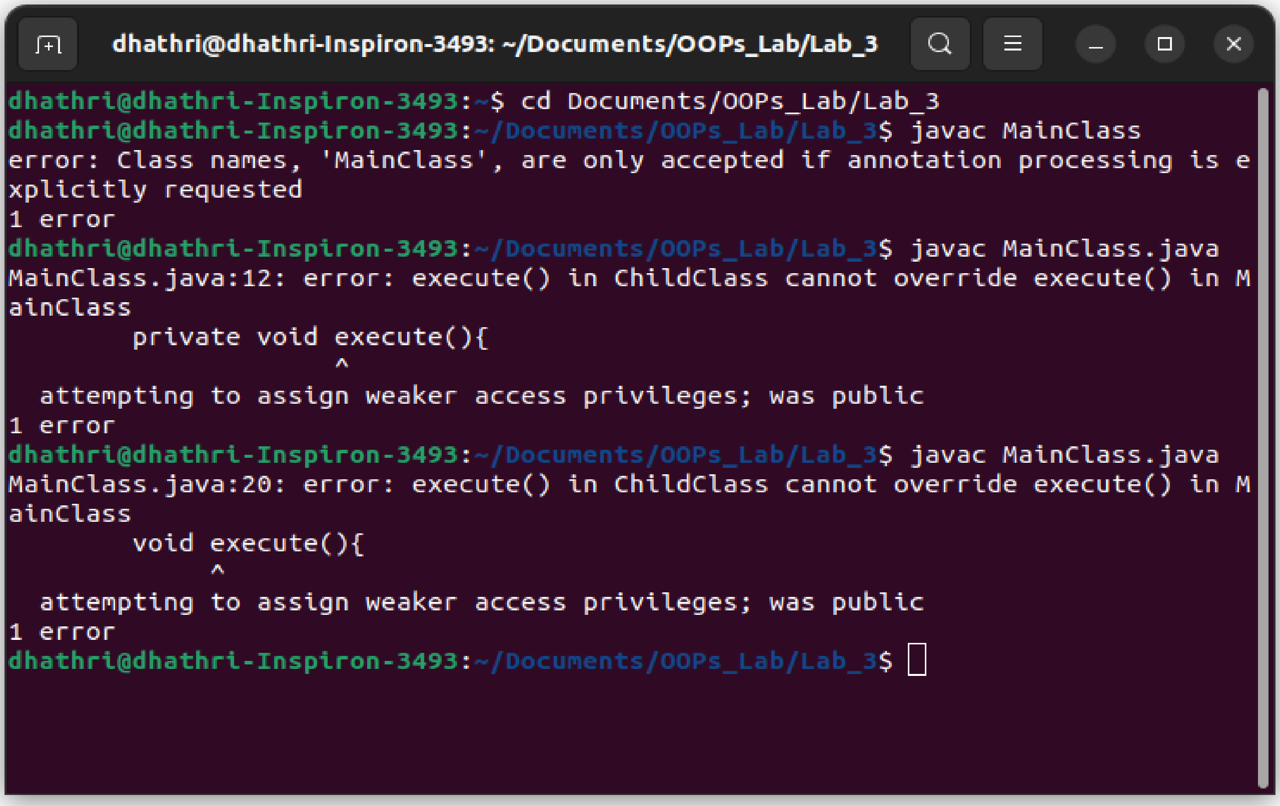
```
dhathri@dhathri-Inspiron-3493:~$ cd Documents/OOPs_Lab/Lab_3
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac MainClass
error: Class names, 'MainClass', are only accepted if annotation processing is e
xplicitly requested
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac MainClass.java
MainClass.java:12: error: execute() in ChildClass cannot override execute() in M
ainClass
        private void execute(){
                     ^
  attempting to assign weaker access privileges; was public
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

3. Using Default access modifier



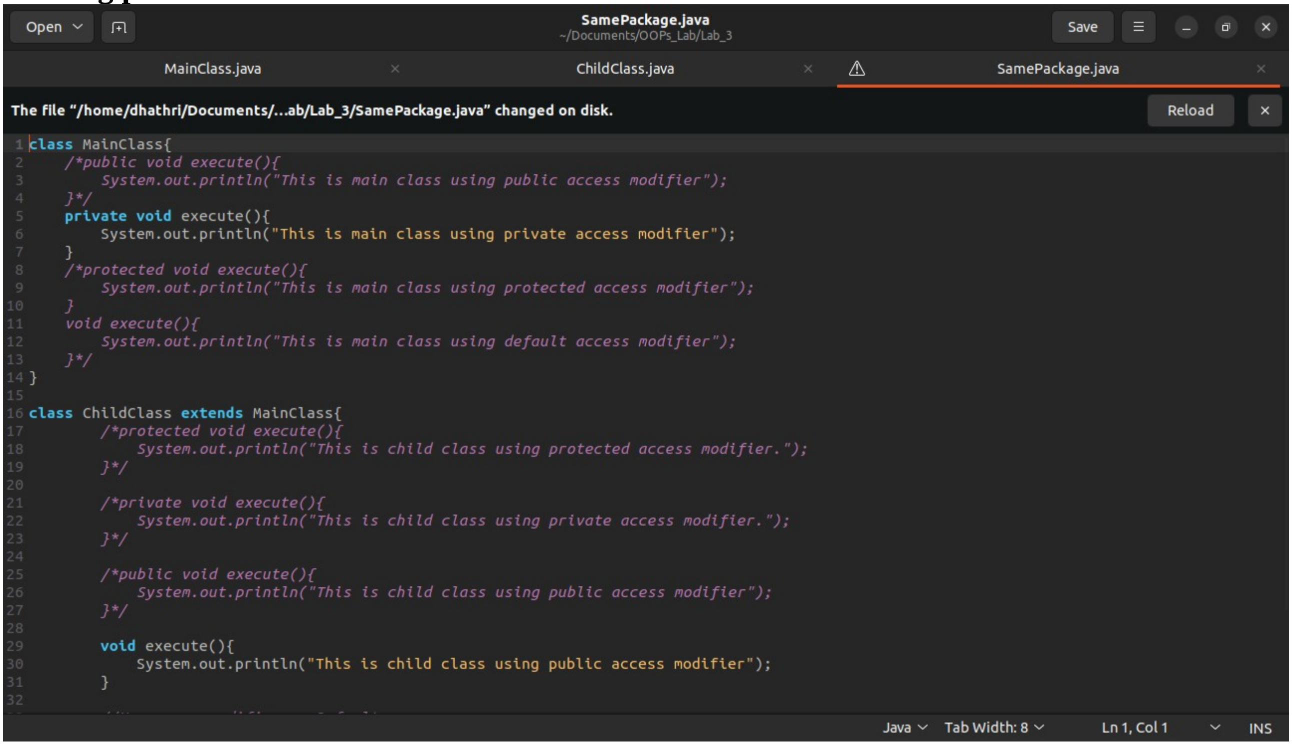
The file "/home/dhathri/Documents/...ab/Lab_3/SamePackage.java" changed on disk.

```java
class MainClass{
    /*public void execute(){
        System.out.println("This is main class using public access modifier");
    }*/
    private void execute(){
        System.out.println("This is main class using private access modifier");
    }
    /*protected void execute(){
        System.out.println("This is main class using protected access modifier");
    }
    void execute(){
        System.out.println("This is main class using default access modifier");
    }*/
}

class ChildClass extends MainClass{
        /*protected void execute(){
            System.out.println("This is child class using protected access modifier.");
        }*/

        /*private void execute(){
            System.out.println("This is child class using private access modifier.");
        }*/

        /*public void execute(){
            System.out.println("This is child class using public access modifier");
        }*/

        void execute(){
            System.out.println("This is child class using public access modifier");
        }

```



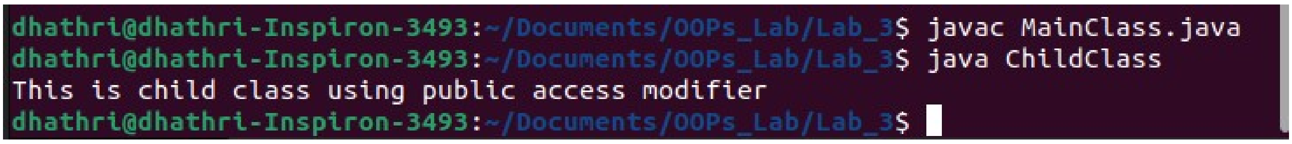
```
dhathri@dhathri-Inspiron-3493:~$ cd Documents/OOPs_Lab/Lab_3
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac MainClass
error: Class names, 'MainClass', are only accepted if annotation processing is e
xplicitly requested
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac MainClass.java
MainClass.java:12: error: execute() in ChildClass cannot override execute() in M
ainClass
        private void execute(){
                     ^
  attempting to assign weaker access privileges; was public
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac MainClass.java
MainClass.java:20: error: execute() in ChildClass cannot override execute() in M
ainClass
        void execute(){
             ^
  attempting to assign weaker access privileges; was public
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

4. Using public access modifier



The file "/home/dhathri/Documents/...ab/Lab_3/SamePackage.java" changed on disk.

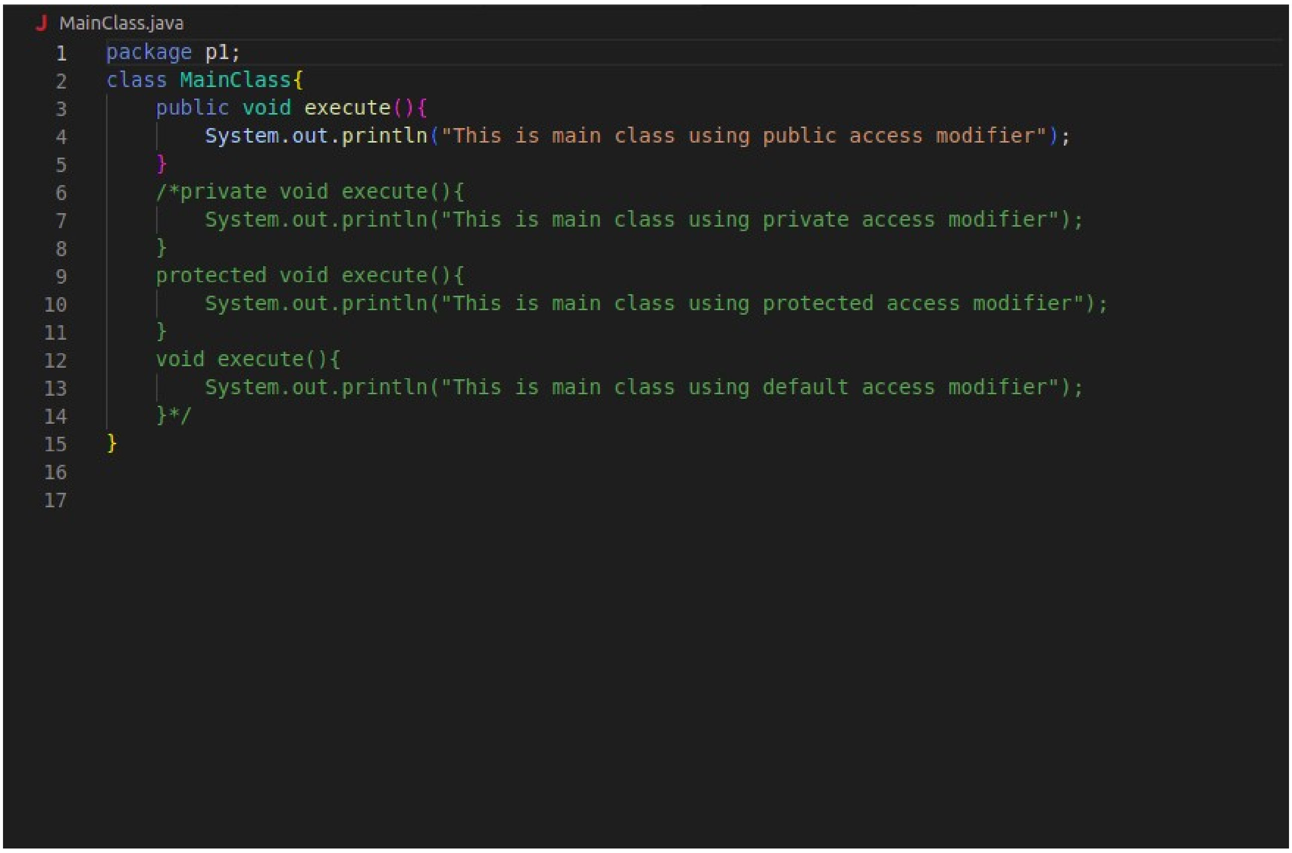
```java
class MainClass{
    /*public void execute(){
        System.out.println("This is main class using public access modifier");
    }*/
    private void execute(){
        System.out.println("This is main class using private access modifier");
    }
    /*protected void execute(){
        System.out.println("This is main class using protected access modifier");
    }
    void execute(){
        System.out.println("This is main class using default access modifier");
    }*/
}

class ChildClass extends MainClass{
        /*protected void execute(){
            System.out.println("This is child class using protected access modifier.");
        }*/

        /*private void execute(){
            System.out.println("This is child class using private access modifier.");
        }*/

        /*public void execute(){
            System.out.println("This is child class using public access modifier");
        }*/

        void execute(){
            System.out.println("This is child class using public access modifier");
        }

```



```
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac MainClass.java
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ java ChildClass
This is child class using public access modifier
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

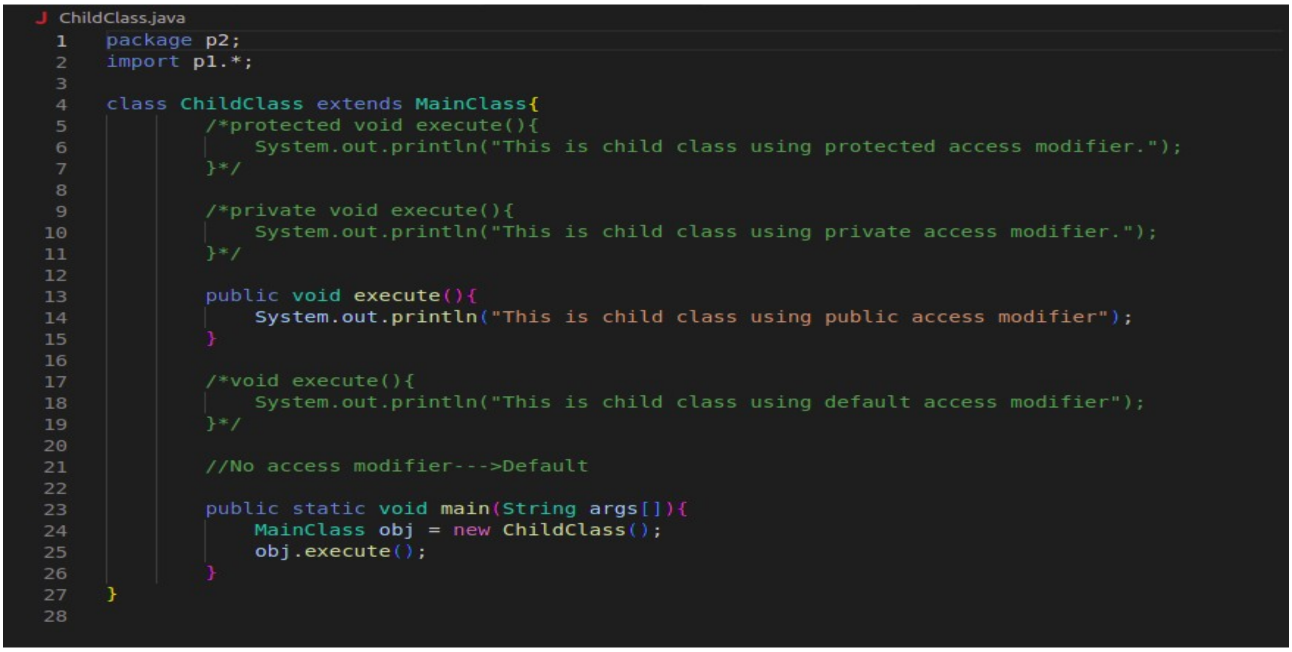
Using different packages-

Main class-



```java
package p1;
class MainClass{
    public void execute(){
        System.out.println("This is main class using public access modifier");
    }
    /*private void execute(){
        System.out.println("This is main class using private access modifier");
    }
    protected void execute(){
        System.out.println("This is main class using protected access modifier");
    }
    void execute(){
        System.out.println("This is main class using default access modifier");
    }*/
}
```

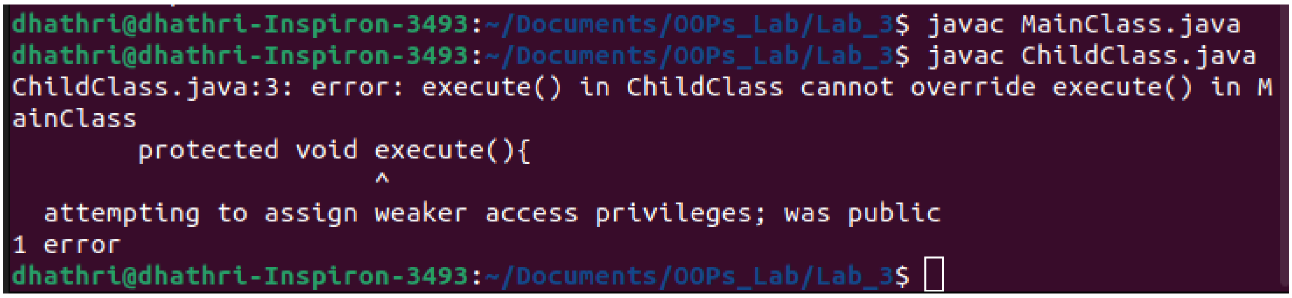
Child Class-



```java
package p2;
import p1.*;

class ChildClass extends MainClass{
        /*protected void execute(){
            System.out.println("This is child class using protected access modifier.");
        }*/

        /*private void execute(){
            System.out.println("This is child class using private access modifier.");
        }*/

        public void execute(){
            System.out.println("This is child class using public access modifier");
        }

        /*void execute(){
            System.out.println("This is child class using default access modifier");
        }*/

        //No access modifier--->Default

        public static void main(String args[]){
            MainClass obj = new ChildClass();
            obj.execute();
        }
}
```

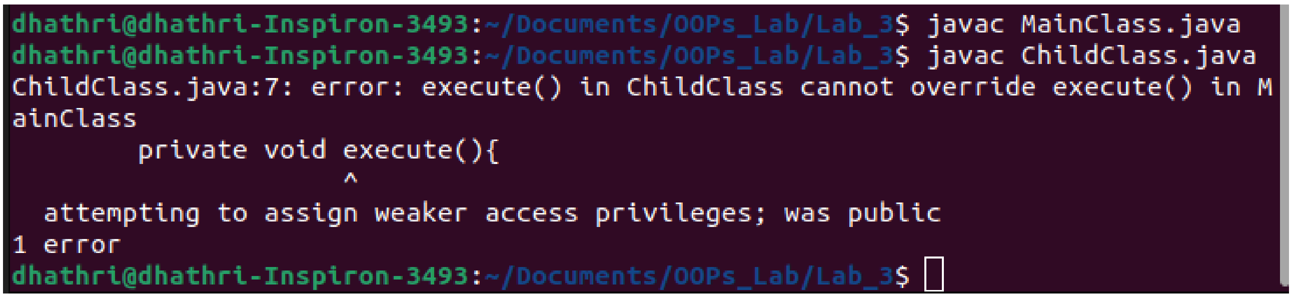
We check with with each access modifier like we did before and get the following outputs-

Using protected access modifier-



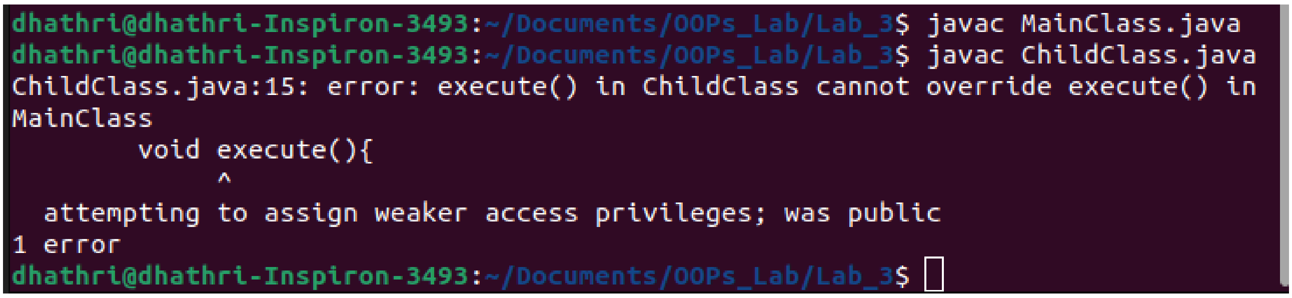
```
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac MainClass.java
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac ChildClass.java
ChildClass.java:3: error: execute() in ChildClass cannot override execute() in M
ainClass
        protected void execute(){
                       ^
  attempting to assign weaker access privileges; was public
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$
```

Using private access modifier-



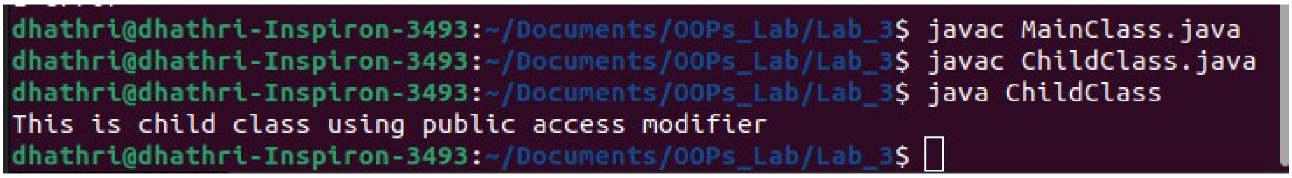
```
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac MainClass.java
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac ChildClass.java
ChildClass.java:7: error: execute() in ChildClass cannot override execute() in M
ainClass
        private void execute(){
                     ^
  attempting to assign weaker access privileges; was public
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$
```

Using default access modifier-



```
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac MainClass.java
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac ChildClass.java
ChildClass.java:15: error: execute() in ChildClass cannot override execute() in
MainClass
        void execute(){
             ^
  attempting to assign weaker access privileges; was public
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$
```

Using public access modifier-

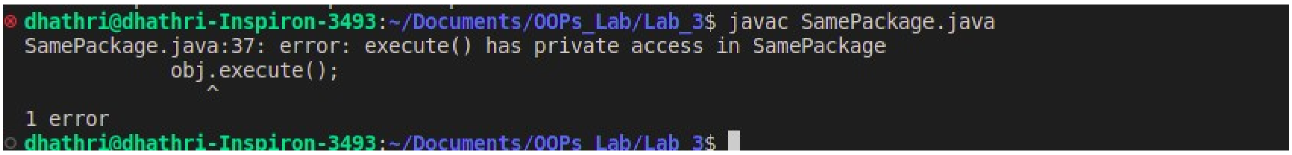


```
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac MainClass.java
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac ChildClass.java
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ java ChildClass
This is child class using public access modifier
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$
```

Hence public cannot be overriden by private, protected and default access modifiers.

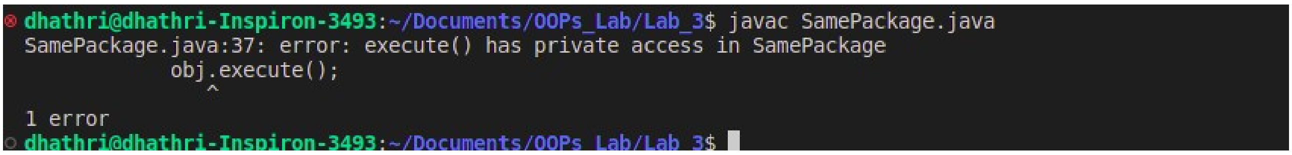
Putting private in the parent class-

Using default access modifier-



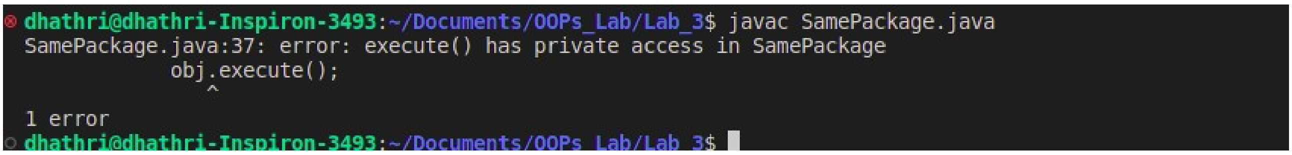
```
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
SamePackage.java:37: error: execute() has private access in SamePackage
            obj.execute();
               ^
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

Using private access modifier-



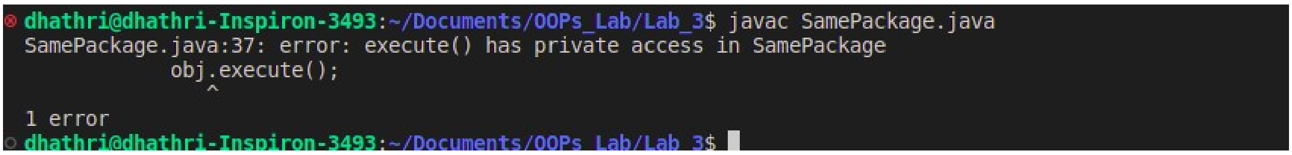
```
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
SamePackage.java:37: error: execute() has private access in SamePackage
            obj.execute();
               ^
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

Using public access modifier-



```
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
SamePackage.java:37: error: execute() has private access in SamePackage
            obj.execute();
               ^
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

Using protected access modifier-

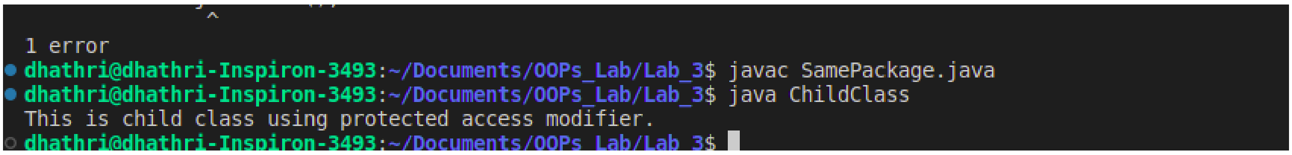


```
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
SamePackage.java:37: error: execute() has private access in SamePackage
            obj.execute();
               ^
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

Hence private cannot be overriden by any function.

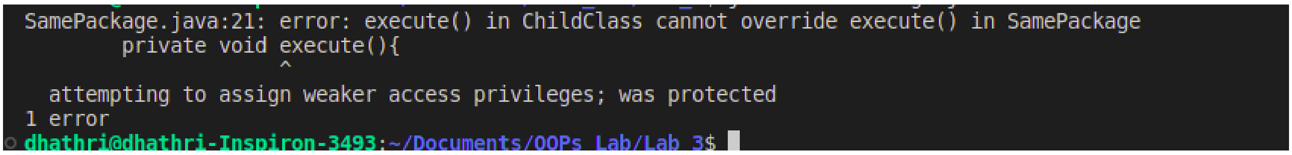
Putting protected in parent class-

Using protected access modifier-



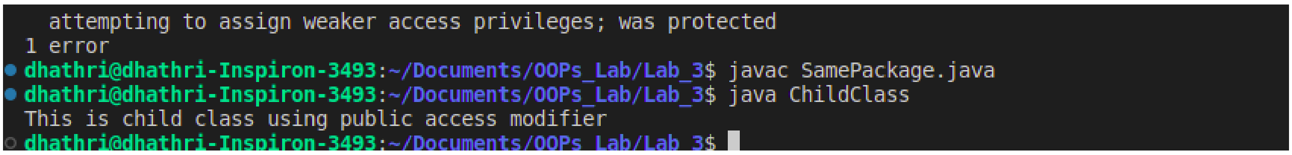
```
              ^
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ java ChildClass
This is child class using protected access modifier.
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$
```

Using private access modifier-



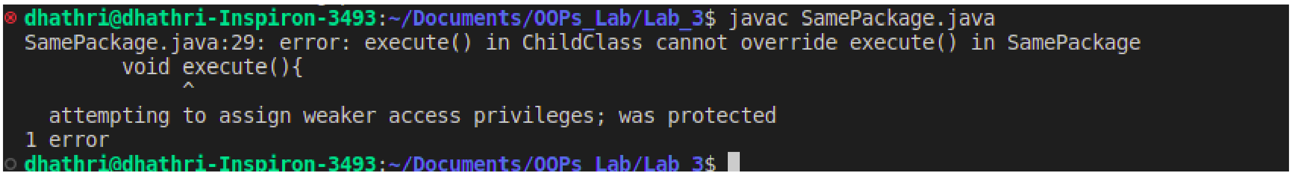
```
SamePackage.java:21: error: execute() in ChildClass cannot override execute() in SamePackage
        private void execute(){
                     ^
  attempting to assign weaker access privileges; was protected
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$
```

Using public access modifier-



```
  attempting to assign weaker access privileges; was protected
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ java ChildClass
This is child class using public access modifier
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$
```

Using default access modifier-

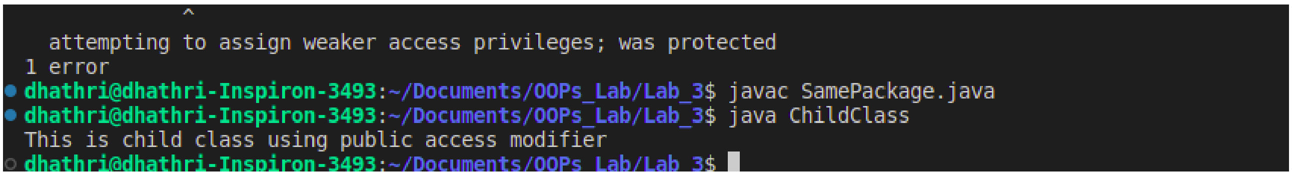


```
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
SamePackage.java:29: error: execute() in ChildClass cannot override execute() in SamePackage
        void execute(){
             ^
  attempting to assign weaker access privileges; was protected
1 error
dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$
```

Hence protected cannot be overriden by protected and default.

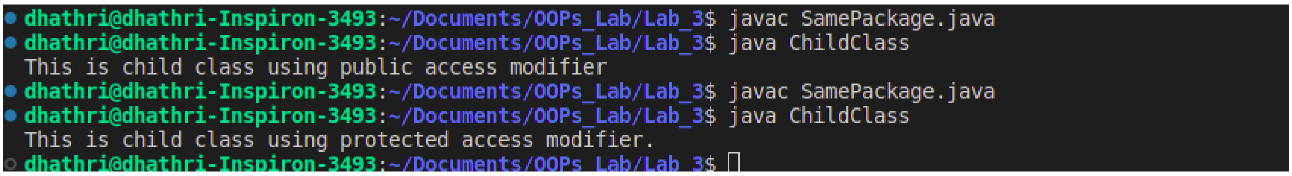
Putting default in parent class-

Using default access modifier-



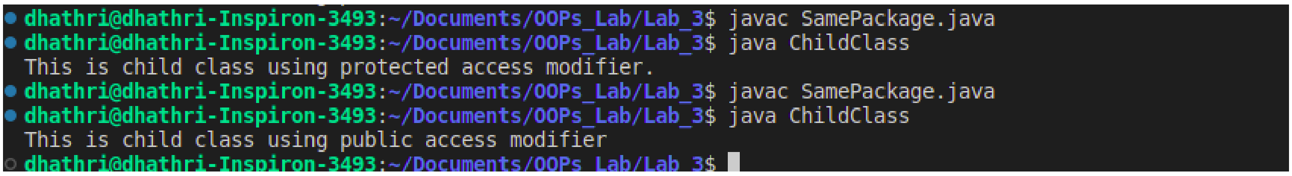
```
                 ^
    attempting to assign weaker access privileges; was protected
  1 error
● dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
● dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ java ChildClass
  This is child class using public access modifier
○ dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

Using protected access modifier-



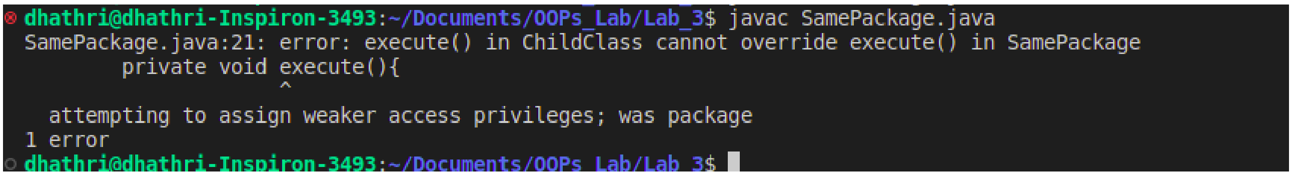
```
● dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
● dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ java ChildClass
  This is child class using public access modifier
● dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
● dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ java ChildClass
  This is child class using protected access modifier.
○ dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

Using public access modifier-



```
● dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
● dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ java ChildClass
  This is child class using protected access modifier.
● dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
● dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ java ChildClass
  This is child class using public access modifier
○ dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

Using private access modifier-



```
⊗ dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ javac SamePackage.java
  SamePackage.java:21: error: execute() in ChildClass cannot override execute() in SamePackage
          private void execute(){
                              ^
    attempting to assign weaker access privileges; was package
  1 error
○ dhathri@dhathri-Inspiron-3493:~/Documents/OOPs_Lab/Lab_3$ 
```

Hence default cannot be overriden by private access modifier.