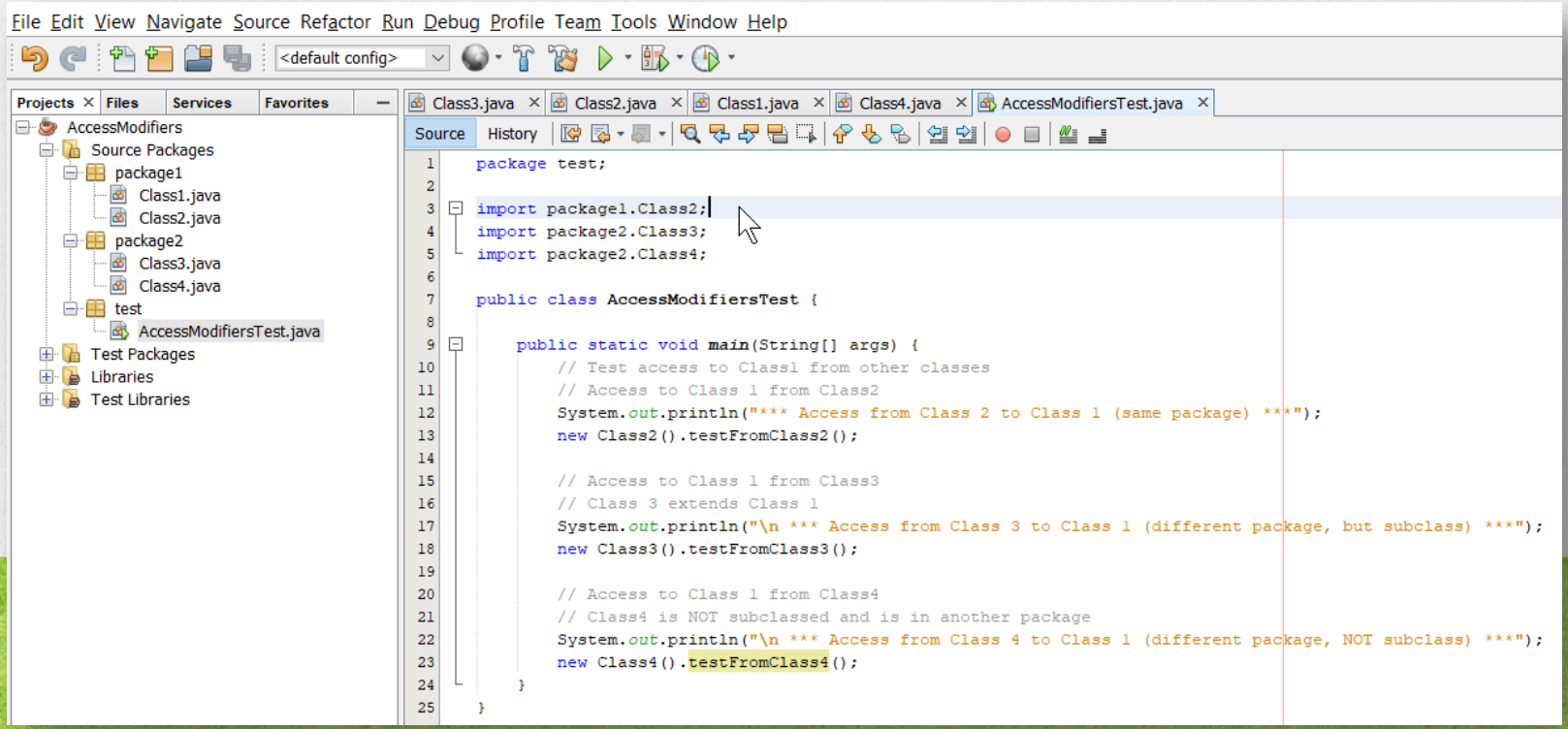
EXERCISE

ACCESS MODIFIERS IN JAVA

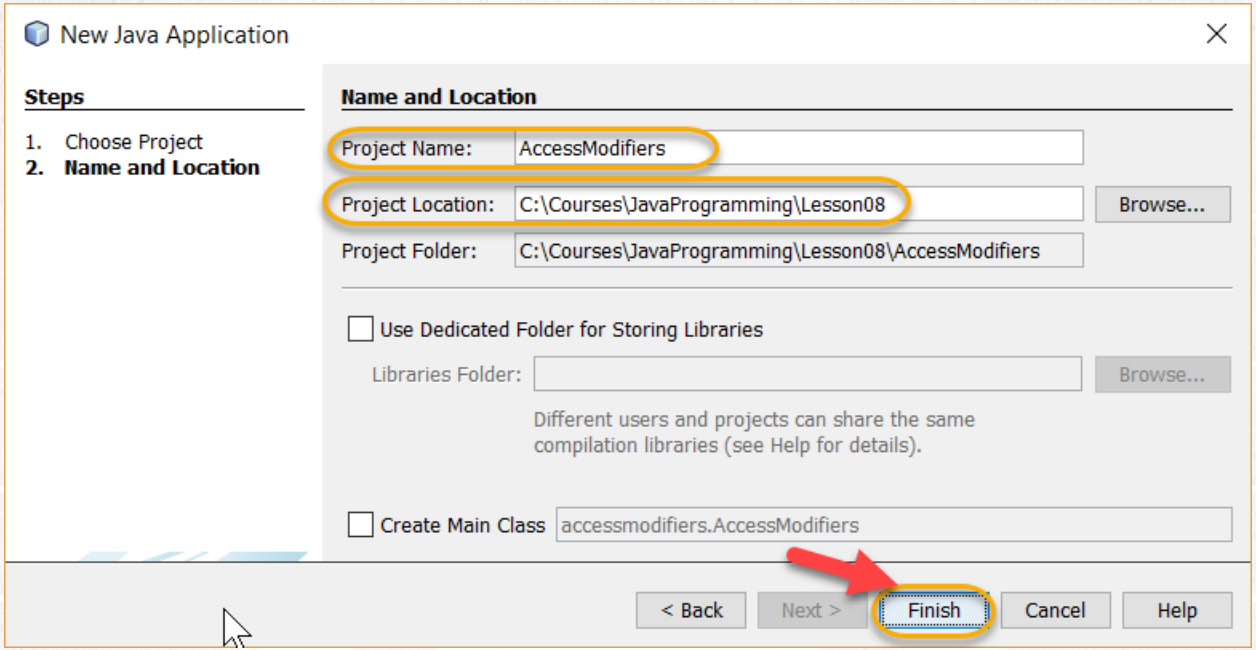
EXERCISE OBJECTIVE

Create a program to practice the handling of access modifiers in Java. At the end we should observe the following:



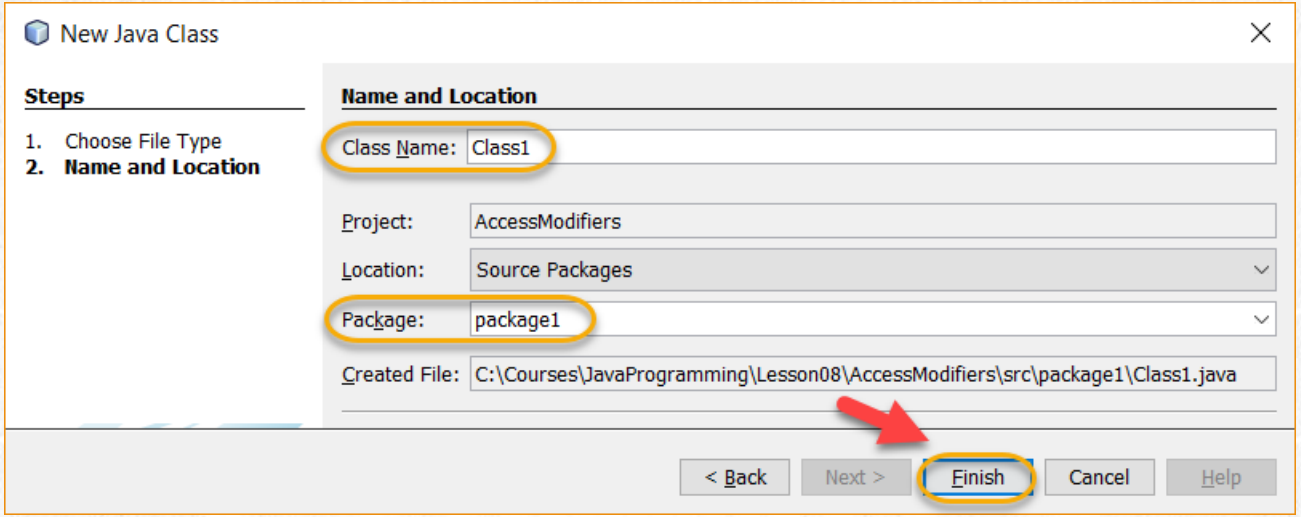
1. CREATE A NEW PROJECT

Create a new project:



2. CREATE A NEW CLASS

Create a new class:



3. MODIFY THE CODE

Class1.java:

```java
package package1;

public class Class1 {

    //Definicion de atributos
    public int publicAttribute = 5;
    protected int protectedAttribute = 6;
    int packageAttribute = 7;
    private int privateAttribute = 8;

    //Constructores
    public Class1() {
    }

    public Class1(int i) {
        System.out.println("Public Constructor 1");

    }

    protected Class1(int i, int j) {
        System.out.println("Protected Constructor 2");
    }

    Class1(int i, int j, int k) {
        System.out.println("Package Constructor 3");
    }
```

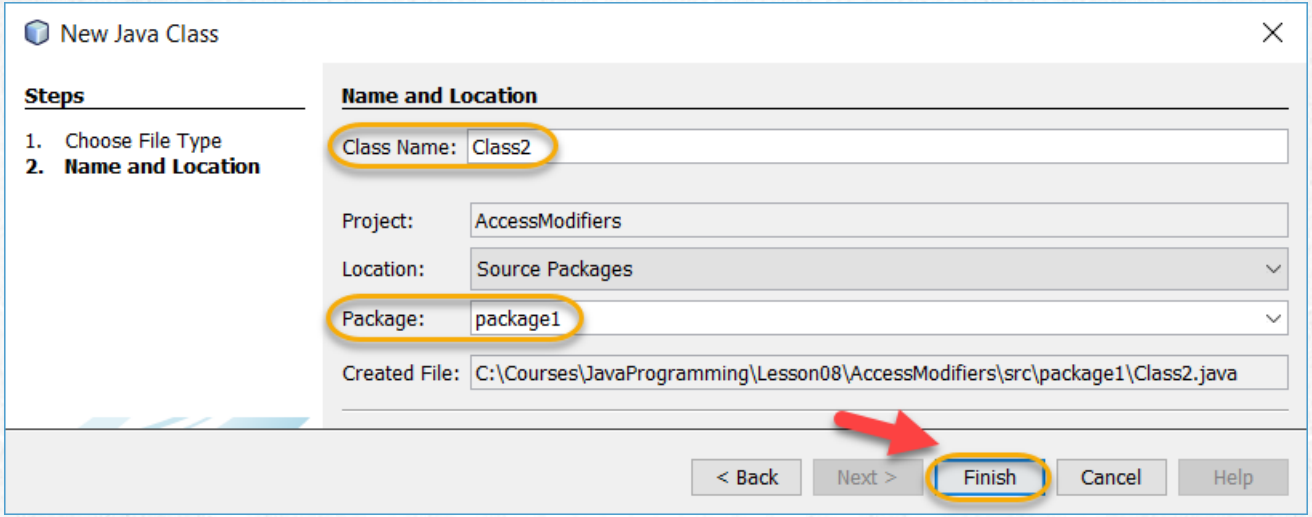
3. MODIFY THE CODE

Class1.java:

```
    private Class1(int i, int j, int k, int l) {
        System.out.println("Private Constructor 4");
    }

    //Method definitions
    public int publicMethod() {
        return 9;
    }

    protected int protectedMethod() {
        return 10;
    }

    int packageMethod() {
        return 11;
    }

    private int privateMethod() {
        return 12;
    }
}
```

4. CREATE A NEW CLASS

Create a new class:



5. MODIFY THE CODE

Class2.java:

```
package package1;

public class Class2 {

    public Class2() {
        //Test Constructors of Class1
        System.out.println("");
        //Public Constructor
        new Class1(1);
        //Protected Constructor
        new Class1(1, 2);
        //Default o Package Constructor
        new Class1(1, 2, 3);
        //Private Constructor is not accesible (has private access)
        //new Class1(1, 2, 3,4);
        System.out.println("Access denied to private constructor");
    }
```

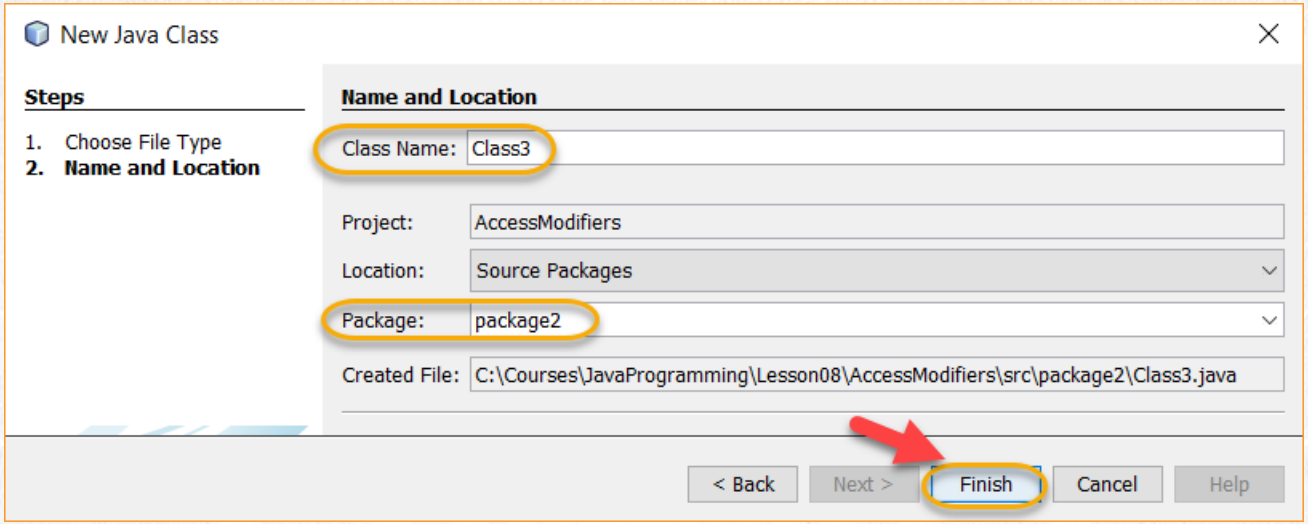
5. MODIFY THE CODE

Class2.java:

```
    public void testFromClass2() {
        //Access to Class1 from Class2
        Class1 c1 = new Class1();
        System.out.println("");
        System.out.println("Public Attribute: " + c1.publicAttribute);
        System.out.println("Protected Attribute: " + c1.protectedAttribute);
        System.out.println("Package attribute: " + c1.packageAttribute);
        //System.out.println("Private Attribute: " + c1.privateAttribute);//has private access
        System.out.println("Private Attribute: Access Denied");

        System.out.println("");
        System.out.println("Public Method: " + c1.publicMethod());
        System.out.println("Protected Method: " + c1.protectedMethod());
        System.out.println("Default Method: " + c1.packageMethod());
        //System.out.println("Private Method :" + c1.privateMethod());//has private access
        System.out.println("Private Method: Access Denied");
    }
}
```

6. CREATE A NEW CLASS

Create a new class:



7. MODIFY THE CODE

Class3.java:

```
package package2;

import package1.Class1;

public class Class3 extends Class1{

    public Class3(){
        //Protected constructor, being a subclass can access
        //even if it is in another package
        super(1,2);
        //package access, and being out of package is restricted
        //super(1,2,3);
        //private access, is restricted because is in another class
        //super(1,2,3,4);
    }
```

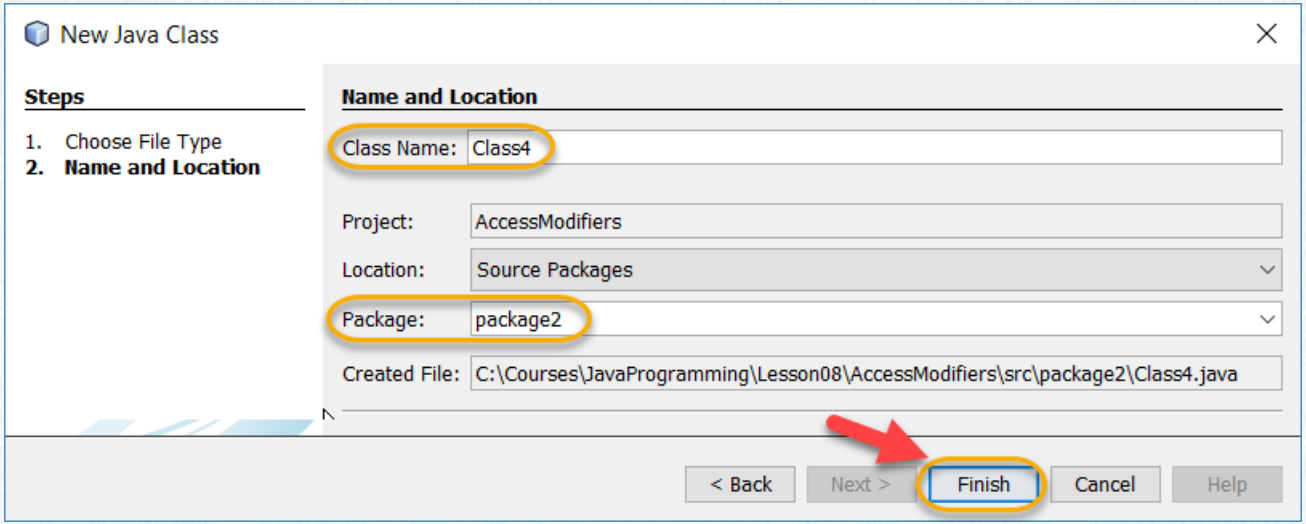
7. MODIFY THE CODE

Class3.java:

```
    public  void testFromClass3() {
        //Access to Class1 from Class3
        //Remember that Class3 extends from Class1
        Class1 c1 = new Class1();
        System.out.println("");
        System.out.println("public attribute:" + c1.publicAttribute + " or inherited:" + this.publicAttribute);
        System.out.println("protected attribute (inherited):" + this.protectedAttribute);
        System.out.println("Default attribute: Can not be accessed from an external package" );
        System.out.println("Private attribute: Access denied" );

        //public constructor
        new Class1();
        //The other constructors can not be tested like this, but from the constructor of this class
        //since this is a subclass in another package
        System.out.println("");
        System.out.println("public method:" + c1.publicMethod());
        System.out.println("protected method (inherited):" + protectedMethod());
        System.out.println("package method: Can not be accessed from an external package");
        System.out.println("Private method: Access denied" );
    }
}
```

8. CREATE A NEW CLASS

Create a new class:



PASO 9. MODIFICAMOS EL CÓDIGO

Class4.java:

```
package package2;

import package1.Class1;

public class Class4 {

    public Class4() {
        // Protected constructor, restricted by not being a subclass
        // super (1,2);
        // Access package, and being out of package is restricted
        // super (1,2,3);
        // Private access, restricted
        // super (1,2,3,4);
    }
```

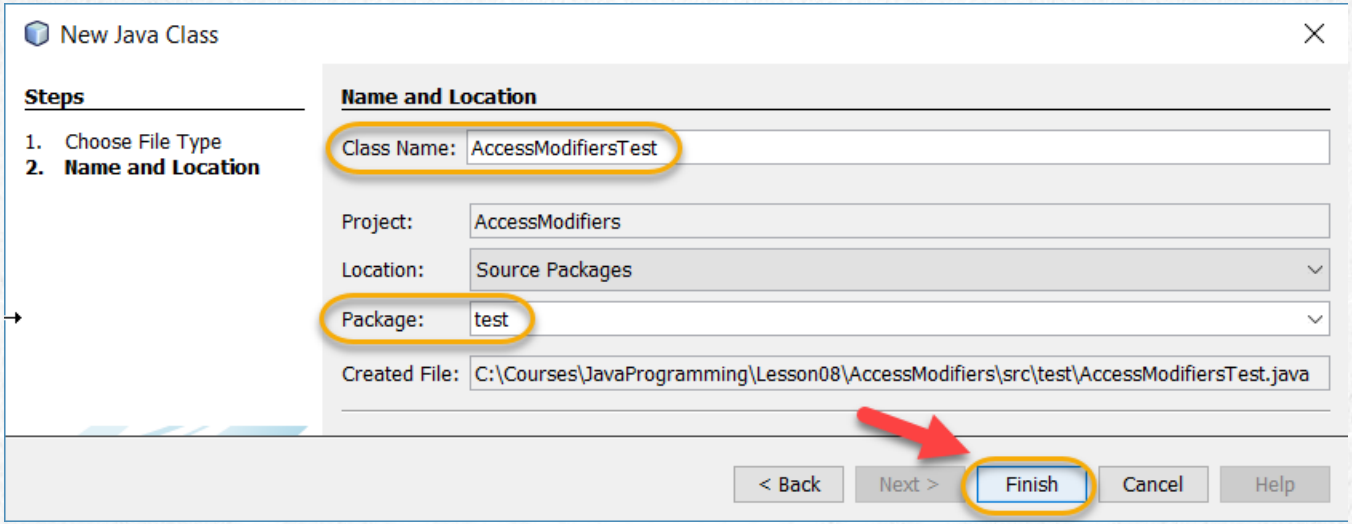
PASO 9. MODIFICAMOS EL CÓDIGO

Class4.java:

```
    public void testFromClass4() {
        // Access to Class 1 from Class4
        // Class4 is NOT subclassed and is in another package
        Class1 c1 = new Class1();
        System.out.println("");
        System.out.println("Public attribute:" + c1.publicAttribute);
        System.out.println("Protected attribute: Can not be accessed from an external package by NOT being a subclass");
        System.out.println("Default attribute: Can not be accessed from an external package");
        System.out.println("Private attribute: Access denied");

        // Public constructor
        new Class1();
        // the other constructors are restricted
        System.out.println("");
        System.out.println("Public method:" + c1.publicMethod());
        System.out.println("Protected method: Can not be accessed from an external package by NOT being a subclass");
        System.out.println("Default method: Can not be accessed from an external package");
        System.out.println("Private method: Access denied");
    }
}
```

10. CREATE A NEW CLASS

Create a new class:



11. MODIFY THE CODE

ModificadoresAcceso.java:

```
package test;

import package1.Class2;
import package2.Class3;
import package2.Class4;

public class AccessModifiersTest {

    public static void main(String[] args) {
        // Test access to Class1 from other classes
        // Access to Class 1 from Class2
        System.out.println("*** Access from Class 2 to Class 1 (same package) ***");
        new Class2().testFromClass2();

        // Access to Class 1 from Class3
        // Class 3 extends Class 1
        System.out.println("\n *** Access from Class 3 to Class 1 (different package, but subclass) ***");
        new Class3().testFromClass3();

        // Access to Class 1 from Class4
        // Class4 is NOT subclassed and is in another package
        System.out.println("\n *** Access from Class 4 to Class 1 (different package, NOT subclass) ***");
        new Class4().testFromClass4();
    }
}
```

PASO 12. EXECUTE THE PROJECT

The result is as follows:

```
*** Access from Class 2 to Class 1 (same package) ***

Public Constructor 1
Protected Constructor 2
Package Constructor 3
Access denied to private constructor

Public Attribute: 5
Protected Attribute: 6
Package attribute: 7
Private Attribute: Access Denied

Public Method: 9
Protected Method: 10
Default Method: 11
Private Method: Access Denied

 *** Access from Class 3 to Class 1 (different package, but
subclass) ***
Protected Constructor 2

public attribute:5 or inherited:5
protected attribute (inherited):6
Default attribute: Can not be accessed from an external
package
Private attribute: Access denied
```

```
public method:9
protected method (inherited):10
package method: Can not be accessed from an external package
Private method: Access denied

 *** Access from Class 4 to Class 1 (different package, NOT
subclass) ***

Public attribute:5
Protected attribute: Can not be accessed from an external
package by NOT being a subclass
Default attribute: Can not be accessed from an external
package
Private attribute: Access denied

Public method:9
Protected method: Can not be accessed from an external
package by NOT being a subclass
Default method: Can not be accessed from an external package
Private method: Access denied
```

EXERCISE CONCLUSION

- With this exercise we have put into practice as access modifiers.

- As we had already studied, the most used are public and private, however it is important to know the application of the others as they are protected and package and thus know the applications that each of these modifiers may have.

ONLINE COURSE

JAVA PROGRAMMING

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