OBJECTIVE-C POLYMORPHISM

The word **polymorphism** means having many forms. Typically, polymorphism occurs when there is a hierarchy of classes and they are related by inheritance.

Objective-C polymorphism means that a call to a member function will cause a different function to be executed depending on the type of object that invokes the function.

Consider the example, we have a class Shape that provides the basic interface for all the shapes. Square and Rectangle are derived from the base class Shape.

We have the method printArea that is going to show about the OOP feature **polymorphism**.

```
#import <Foundation/Foundation.h>

@interface Shape : NSObject

{
    CGFloat area;
}

- (void)printArea;
- (void)calculateArea;
@end

@implementation Shape

- (void)printArea{
    NSLog(@"The area is %f", area);
}

- (void)calculateArea{

}

@end


@interface Square : Shape
{
    CGFloat length;
}

- (id)initWithSide:(CGFloat)side;

- (void)calculateArea;

@end

@implementation Square

- (id)initWithSide:(CGFloat)side{
    length = side;
    return self;
}

- (void)calculateArea{
    area = length * length;
}

- (void)printArea{
    NSLog(@"The area of square is %f", area);
}

@end
```

```
@interface Rectangle : Shape
{
    CGFloat length;
    CGFloat breadth;
}

- (id)initWithLength:(CGFloat)rLength andBreadth:(CGFloat)rBreadth;


@end

@implementation Rectangle

- (id)initWithLength:(CGFloat)rLength andBreadth:(CGFloat)rBreadth{
    length = rLength;
    breadth = rBreadth;
    return self;
}

- (void)calculateArea{
    area = length * breadth;
}

@end


int main(int argc, const char * argv[])
{
    NSAutoreleasePool * pool = [[NSAutoreleasePool alloc] init];
    Shape *square = [[Square alloc]initWithSide:10.0];
    [square calculateArea];
    [square printArea];
    Shape *rect = [[Rectangle alloc]
    initWithLength:10.0 andBreadth:5.0];
    [rect calculateArea];
    [rect printArea];
    [pool drain];
    return 0;
}
```

When the above code is compiled and executed, it produces the following result:

```
2013-09-22 21:21:50.785 Polymorphism[358:303] The area of square is 100.000000
2013-09-22 21:21:50.786 Polymorphism[358:303] The area is 50.000000
```

In the above example based on the availability of the method calculateArea and printArea, either the method in the base class or the derived class executed.

Polymorphism handles the switching of methods between the base class and derived class based on the method implementation of the two classes.