Dealer.h

```objc
#import <Foundation/Foundation.h>
#import "Department.h"
@interface Dealer : NSObject

@property(assign,nonatomic,readwrite) NSString *name;
@property(assign,nonatomic,readwrite) NSString *city;
@property(assign,nonatomic,readwrite) NSString *address;
@property(assign,nonatomic,readwrite) NSString *phone;
@property NSMutableArray<Department* > *departments;

-(void)addDepartment:(Department *) department;

@end
```

Dealer.m

```objc
#import "Dealer.h"
#import "Department.h"
@implementation Dealer

-(void)addDepartment:(Department *) department{
    if(_departments==nil){
        _departments=[[NSMutableArray alloc]init];
    }
    [_departments addObject:department];
}

@end
```

Employee.h

```objc
#import <Foundation/Foundation.h>
#import "Department.h"

@interface Employee : NSObject

@property NSString *firstName;
@property NSString *LastName;
@property NSString *city;
@property NSString *address;
@property NSString *phone;
@property NSString *zip;
@property NSString *ssn;
@property(assign,nonatomic,readwrite) Department *department;
```

@end

Employee.m

```objc
#import "Employee.h"

@implementation Employee



@end
```

Vehicle.h

```objc
#import <Foundation/Foundation.h>
#import "Department.h"

@interface Vehicle : NSObject

@property NSString *make;
@property NSDecimalNumber *miles;
@property NSString *model;
@property NSString *photo;
@property NSDecimalNumber *price;
@property NSInteger rating;
@property NSString *type;
@property NSDate *year;
@property Department *department;

@end
```

Vehicle.m

```objc
#import "Vehicle.h"

@implementation Vehicle

@end
```

Department.h

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

```objc
@class Dealer;
@class Vehicle;
@class Employee;
@interface Department : NSObject

@property(assign,nonatomic,readwrite) NSString *name;
@property(assign,nonatomic,readwrite) NSString *phone;
@property(assign,nonatomic,readwrite) Dealer *dealer;
@property NSMutableArray<Vehicle* > *vehicles;
@property NSMutableArray<Employee* > *employees;

-(void)addVehicle:(Vehicle *) vehicle;
-(void)listVehicles;

-(void)addEmployee:(Employee *) employee;
-(void)listEmployees;

-(NSMutableArray<Vehicle* > *) searchVehicles:(NSString *)
vehicleModel;

@end
```

Department.m

```objc
#import "Department.h"
#import "Dealer.h"
#import "Vehicle.h"
#import "Employee.h"

@implementation Department

-(void)addVehicle:(Vehicle *) vehicle{
    if(_vehicles==nil){
        _vehicles=[[NSMutableArray alloc]init];
    }
    [_vehicles addObject:vehicle];
}

-(void)listVehicles{
    for(Vehicle *v in _vehicles){
        NSLog(@"Inside here");
        NSLog(@"Vehicle Make %@",v.make);
        NSLog(@"Vehicle Model %@",v.model);
        NSLog(@"Vehicle Type %@",v.type);
        NSLog(@"%@",v.price);
        NSLog(@"%li",v.rating);


    }
```

```objc
}


-(NSMutableArray<Vehicle* > *) searchVehicles:(NSString *)
vehicleModel{
    NSMutableArray<Vehicle* >
*listOfVehicles=[[NSMutableArray<Vehicle* > alloc]init];
        for(Vehicle *v in _vehicles){
            if([v.model isEqualToString:vehicleModel]){
                [listOfVehicles addObject:v];
            }


        }

    return listOfVehicles;
}

-(void)addEmployee:(Employee *)employee{
    if (_employees==nil) {
        _employees=[[NSMutableArray alloc] init];
    }
    [_employees addObject:employee];
}

-(void)listEmployees{
    for(Employee *e in _employees){
        NSLog(@"Inside here");
        NSLog(@"%@",e.firstName);
        NSLog(@"%@",e.LastName);
        NSLog(@"%@",e.city);
        NSLog(@"%@",e.address);
        NSLog(@"%@",e.phone);
        NSLog(@"%@",e.zip);
        NSLog(@"%@",e.ssn);

    }

}

@end



Main.m

//
//  main.m
//  Assignment3
```

```objc
//

//  Copyright © 2016 nirmal. All rights reserved.
//

#import <Foundation/Foundation.h>
#import "Department.h"
#import "Employee.h"
#import "Dealer.h"
#import "Vehicle.h"

int alphabeticalCheck(NSString *str);
int phoneNumberCheck(NSString *phoneNo);
int alphaNumericCheck(NSString *str1);


int main(int argc, const char * argv[]) {
    @autoreleasepool {


        char dName[2048]={ 0} ,dPhone[2048]={ 0 } ;
        char deaName[2048]={ 0},deaPhone[2048]={ 0 },deaCity[2048]={ 0
},deaAddress[2048]={ 0 },vMake[2048]={ 0 },
        vModel[2048]={ 0 },veType[2048]={ 0 };

        char eFirstName[2048]={0}, eLastName[2048]={0},
eCity[2048]={0}, eAddress[2048]={0}, ePhone[2048]={0},
        eZip[2048]={0}, eSSN[2048]={0};

        //Get the Dealer Details

        NSLog(@"Enter the Dealer Details");
        NSLog(@"Dealer Name(Only Alphabets):");
        scanf("%s",deaName);
        NSLog(@"Dealer Phone No(Only Numbers up to 10 digits");
        scanf("%s",deaPhone);
        NSLog(@"Dealer City(Only Alphabets):");
        scanf("%s",deaCity);
        NSLog(@"Dealer Address(Only Alphanumeric");
        scanf("%s",deaAddress);

        NSString *dealerName = [NSString
stringWithUTF8String:deaName];
        NSString *dealerPhone= [NSString
stringWithUTF8String:deaPhone];
        NSString *dealerCity = [NSString
stringWithUTF8String:deaCity];
        NSString *dealerAddress= [NSString
stringWithUTF8String:deaAddress];
```

```objc
        if(alphabeticalCheck(dealerName)==1){
            NSLog(@" Error !! Enter only alphabets for Department
Name");
            exit(0);
        }
        if(phoneNumberCheck(dealerPhone)==1){
            NSLog(@"Error !! Enter only 10 digit Nos for Phone no");
            exit(0);
        }
        if(alphabeticalCheck(dealerCity)==1){
            NSLog(@" Error !! Enter only alphabets for Dealer City");
            exit(0);
        }

        if(alphaNumericCheck(dealerAddress)==1){
            NSLog(@" Error !! Enter only Number and alphabets for
Department Name");
            exit(0);
        }



        Dealer *dealer=[Dealer alloc];
        dealer.name=dealerName;
        dealer.address=dealerAddress;
        dealer.city=dealerCity;
        dealer.phone=dealerPhone;

        //Get the Department Details

        NSLog(@"Enter the Department Details");
        NSLog(@"Department Name(Only Alphabets):");
        scanf("%s",dName);
        NSLog(@"Phone No(Only Numbers up to 10 digits");
        scanf("%s",dPhone);


        NSString *deptName = [NSString stringWithUTF8String:dName];
        NSString *deptPhone= [NSString stringWithUTF8String:dPhone];

        if(alphabeticalCheck(deptName)==1){
            NSLog(@" Error !! Enter only alphabets for Department
Name");
            exit(0);
        }
        if(phoneNumberCheck(deptPhone)==1){
            NSLog(@"Error !! Enter only 10 digit Nos for Phone no");
            exit(0);
        }
```

```objc
            Department *dept=[Department alloc];
            dept.name=deptName;
            dept.phone=deptPhone;
            dept.dealer=dealer;




            double miles,price;
            NSInteger vRating;




            BOOL value=YES;
            while(value){

                NSLog(@"1: Add a Vehicle  2: List Vehicle  3: Search
Vehicle 4: Add Employee 5: List Employees");

                int option;
                scanf("%d",&option);

                switch(option){
                    case 1:
                    {
                        //Get the Vehicle Details

                        NSLog(@"Enter the Vehicle Details");
                        NSLog(@"Vehicle Make(Only Alphabets):");
                        scanf("%s",vMake);
                        NSLog(@"Vehicle Model(Only Alphabets):");
                        scanf("%s",vModel);
                        NSLog(@"Vehicle Type(Only Alphabets):");
                        scanf("%s",veType);
                        NSLog(@"Miles(Only Decimals):");
                        scanf("%lf",&miles);
                        NSLog(@"Price(Only Decimals):");
                        scanf("%lf",&price);
                        NSLog(@"Vehicle Rating");
                        scanf("%li",&vRating);

                        Vehicle *vehicle=[Vehicle alloc];
                        vehicle.make=[NSString
stringWithUTF8String:vMake];
                        vehicle.model=[NSString
stringWithUTF8String:vModel];
                        vehicle.type=[NSString
stringWithUTF8String:veType];
                        vehicle.miles=[NSDecimalNumber
```

```objc
decimalNumberWithDecimal:[[NSNumber
numberWithDouble:miles]decimalValue]];
                vehicle.price=[NSDecimalNumber
decimalNumberWithDecimal:[[NSNumber
numberWithDouble:price]decimalValue]];
                vehicle.year=[NSDate date];
                vehicle.rating=vRating;
                vehicle.department=dept;

                [dept addVehicle:vehicle];
                break;
            }
            case 2:
            {
                //List the Vehicles

                [dept listVehicles];
                break;
            }

            case 3:
            {
                //Search the Vehicles

                NSString *searchModel;
                char model[2048]={ 0 };
                NSLog(@"Enter the Vehicle Model");
                scanf("%s",model);
                searchModel=[NSString stringWithUTF8String:model];
                NSMutableArray<Vehicle* >
*searchedVehicles=[[NSMutableArray<Vehicle* > alloc]init];
                searchedVehicles=[dept
searchVehicles:searchModel];
                if(searchedVehicles!=nil){
                for(Vehicle *veh in searchedVehicles){
                    NSLog(@"Vehicle Make %@",veh.make);
                    NSLog(@"Vehicle Model %@",veh.model);
                    NSLog(@"Vehicle Type %@",veh.type);
                    NSLog(@"%@",veh.price);
                    NSLog(@"%li",veh.rating);
                }
                }else{
                    NSLog(@"%@ Model Not Present",searchModel);
                }
                break;
            }

            case 4:
            {
                //Get the Employee Details
```

```objc
                NSLog(@"Enter the Employee Details");
                NSLog(@"First Name(Only Alphabets):");
                scanf("%s",eFirstName);
                NSLog(@"Last Name(Only Alphabets):");
                scanf("%s",eLastName);
                NSLog(@"City(Only Alphabets):");
                scanf("%s",eCity);
                NSLog(@"Address(Only Alphabets):");
                scanf("%s",eAddress);
                NSLog(@"Phone(Only Numeric):");
                scanf("%s",ePhone);
                NSLog(@"Employee Zip(Only Numeric):");
                scanf("%s",eZip);
                NSLog(@"Employee SSN(Only Numeric):");
                scanf("%s",eSSN);

                Employee *employee = [Employee alloc];
                employee.firstName = [NSString
stringWithUTF8String:eFirstName];
                employee.LastName = [NSString
stringWithUTF8String:eLastName];
                employee.city = [NSString
stringWithUTF8String:eCity];
                employee.address = [NSString
stringWithUTF8String:eAddress];
                employee.phone = [NSString
stringWithUTF8String:ePhone];
                employee.zip = [NSString
stringWithUTF8String:eZip];
                employee.ssn = [NSString
stringWithUTF8String:eSSN];

                [dept addEmployee:employee];
                break;
            }

            case 5:
            {
                //List the Employees

                [dept listEmployees];
                break;
            }

            default:
            {
                NSLog(@"Incorrect Details entered");
                break;
            }
```

```
        }

            int c;
            NSLog(@"Do you wish to continue 1-CONTINUE/0 - EXIT");
            scanf("%d",&c);
            NSLog(@"%d",c);
            if(c == 1)
                value=YES;
            else
                value=NO;

        }



    }
    return 0;
}
```

//Validation for Alphabets

```
int alphabeticalCheck(NSString *str){

    NSString *myregex = @"^[A-Za-z]+$";
    int i=0;
    NSPredicate *deptNameTest = [NSPredicate
predicateWithFormat:@"SELF MATCHES %@", myregex];
    if (![deptNameTest evaluateWithObject:str])  {
        i=1;
    }
    return i;

}
```

//Validation for Phone Number

```
int phoneNumberCheck(NSString *phoneNo){

    NSString *phoneRegex = @"[0-9]{10}";
    NSPredicate *test = [NSPredicate predicateWithFormat:@"SELF
MATCHES %@", phoneRegex];
    BOOL matches = [test evaluateWithObject:phoneNo];
    int i=0;
    if(!matches){
        i=1;
    }
    return i;
}
```

//Validation for Alphanumeric

```objc
int alphaNumericCheck(NSString *str1){

    NSString *myregex = @"^[A-Za-z0-9 ]+$";
    int i=0;
    NSPredicate *deptNameTest = [NSPredicate
predicateWithFormat:@"SELF MATCHES %@", myregex];
    if (![deptNameTest evaluateWithObject:str1])  {
        i=1;
    }
    return i;
}
```

OUTPUT

Screenshot1:

Adding Dealer, Departments, Vehicles

```
2016-10-16 20:03:37.916 Assignment3[28764:714768] Enter the Dealer Details
2016-10-16 20:03:37.917 Assignment3[28764:714768] Dealer Name(Only Alphabets):
hotwire
2016-10-16 20:03:47.366 Assignment3[28764:714768] Dealer Phone No(Only Numbers up to 10 digits
9876541230
2016-10-16 20:03:51.758 Assignment3[28764:714768] Dealer City(Only Alphabets):
boston
2016-10-16 20:04:11.502 Assignment3[28764:714768] Dealer Address(Only Alphanumeric
75saintalphonsus
2016-10-16 20:04:16.970 Assignment3[28764:714768] Enter the Department Details
2016-10-16 20:04:16.970 Assignment3[28764:714768] Department Name(Only Alphabets):
sales
2016-10-16 20:04:20.510 Assignment3[28764:714768] Phone No(Only Numbers up to 10 digits
9876541230
2016-10-16 20:04:24.311 Assignment3[28764:714768] 1: Add a Vehicle  2: List Vehicle  3: Search Vehicle 4: Add
Employee 5: List Employees
1
2016-10-16 20:04:26.214 Assignment3[28764:714768] Enter the Vehicle Details
2016-10-16 20:04:26.214 Assignment3[28764:714768] Vehicle Make(Only Alphabets):
honda
2016-10-16 20:04:30.638 Assignment3[28764:714768] Vehicle Model(Only Alphabets):
civic
2016-10-16 20:04:38.878 Assignment3[28764:714768] Vehicle Type(Only Alphabets):
fourwheeler
2016-10-16 20:04:42.422 Assignment3[28764:714768] Miles(Only Decimals):
89
2016-10-16 20:04:44.582 Assignment3[28764:714768] Price(Only Decimals):
9876
2016-10-16 20:04:46.750 Assignment3[28764:714768] Vehicle Rating
9
2016-10-16 20:04:48.798 Assignment3[28764:714768] Do you wish to continue 1-CONTINUE/0 – EXIT
1
2016-10-16 20:04:51.638 Assignment3[28764:714768] 1
2016-10-16 20:04:51.638 Assignment3[28764:714768] 1: Add a Vehicle  2: List Vehicle  3: Search Vehicle 4: Add
Employee 5: List Employees
1
2016-10-16 20:04:54.301 Assignment3[28764:714768] Enter the Vehicle Details
2016-10-16 20:04:54.302 Assignment3[28764:714768] Vehicle Make(Only Alphabets):
honda
2016-10-16 20:04:57.013 Assignment3[28764:714768] Vehicle Model(Only Alphabets):
accord
2016-10-16 20:04:59.006 Assignment3[28764:714768] Vehicle Type(Only Alphabets):
fourwheeler
2016-10-16 20:05:05.990 Assignment3[28764:714768] Miles(Only Decimals):
98
2016-10-16 20:05:08.141 Assignment3[28764:714768] Price(Only Decimals):
7654
2016-10-16 20:05:10.158 Assignment3[28764:714768] Vehicle Rating
9
2016-10-16 20:05:11.598 Assignment3[28764:714768] Do you wish to continue 1-CONTINUE/0 – EXIT
1
2016-10-16 20:05:13.117 Assignment3[28764:714768] 1
2016-10-16 20:05:13.118 Assignment3[28764:714768] 1: Add a Vehicle  2: List Vehicle  3: Search Vehicle 4: Add
```

Screenshot 2

Listing the Vehicles and Searching the Vehicles

```
2016-10-16 20:05:11.598 Assignment3[28764:714768] Do you wish to continue 1-CONTINUE/0 - EXIT
1
2016-10-16 20:05:13.117 Assignment3[28764:714768] 1
2016-10-16 20:05:13.118 Assignment3[28764:714768] 1: Add a Vehicle  2: List Vehicle  3: Search Vehicle 4: Add
Employee 5: List Employees
2
2016-10-16 20:05:17.909 Assignment3[28764:714768] Inside here
2016-10-16 20:05:17.910 Assignment3[28764:714768] Vehicle Make honda
2016-10-16 20:05:17.910 Assignment3[28764:714768] Vehicle Model civic
2016-10-16 20:05:17.910 Assignment3[28764:714768] Vehicle Type fourwheeler
2016-10-16 20:05:17.910 Assignment3[28764:714768] Vehicle Price9876
2016-10-16 20:05:17.910 Assignment3[28764:714768] Vehicle Rating9
2016-10-16 20:05:17.915 Assignment3[28764:714768] Vehicle Date2016-10-17 00:04:48 +0000
2016-10-16 20:05:17.915 Assignment3[28764:714768] Inside here
2016-10-16 20:05:17.915 Assignment3[28764:714768] Vehicle Make honda
2016-10-16 20:05:17.915 Assignment3[28764:714768] Vehicle Model accord
2016-10-16 20:05:17.915 Assignment3[28764:714768] Vehicle Type fourwheeler
2016-10-16 20:05:17.915 Assignment3[28764:714768] Vehicle Price7654
2016-10-16 20:05:17.915 Assignment3[28764:714768] Vehicle Rating9
2016-10-16 20:05:17.915 Assignment3[28764:714768] Vehicle Date2016-10-17 00:05:11 +0000
2016-10-16 20:05:17.915 Assignment3[28764:714768] Do you wish to continue 1-CONTINUE/0 - EXIT
1
2016-10-16 20:05:20.894 Assignment3[28764:714768] 1
2016-10-16 20:05:20.894 Assignment3[28764:714768] 1: Add a Vehicle  2: List Vehicle  3: Search Vehicle 4: Add
Employee 5: List Employees
3
2016-10-16 20:05:28.782 Assignment3[28764:714768] Enter the Vehicle Model
accord
2016-10-16 20:05:31.094 Assignment3[28764:714768] Vehicle Make honda
2016-10-16 20:05:31.094 Assignment3[28764:714768] Vehicle Model accord
2016-10-16 20:05:31.094 Assignment3[28764:714768] Vehicle Type fourwheeler
2016-10-16 20:05:31.094 Assignment3[28764:714768] 7654
2016-10-16 20:05:31.094 Assignment3[28764:714768] 9
2016-10-16 20:05:31.094 Assignment3[28764:714768] Do you wish to continue 1-CONTINUE/0 - EXIT
1
```

Screenshot 3

Adding the employees and listing the employees

```
2016-10-16 20:46:10.334 Assignment3[29200:733345] 1: Add a Vehicle  2: List Vehicle  3: Search Vehicle 4: Add
Employee 5: List Employees
4
2016-10-16 20:46:15.894 Assignment3[29200:733345] Enter the Employee Details
2016-10-16 20:46:15.895 Assignment3[29200:733345] First Name(Only Alphabets):
nirmal
2016-10-16 20:46:17.998 Assignment3[29200:733345] Last Name(Only Alphabets):
anand
2016-10-16 20:46:18.990 Assignment3[29200:733345] City(Only Alphabets):
chennai
2016-10-16 20:46:21.438 Assignment3[29200:733345] Address(Only Alphabets):
35alwarpetstreet
2016-10-16 20:46:27.166 Assignment3[29200:733345] Phone(Only Numeric):
6178168125
2016-10-16 20:46:31.150 Assignment3[29200:733345] Employee Zip(Only Numeric):
02120
2016-10-16 20:46:34.911 Assignment3[29200:733345] Employee SSN(Only Numeric):
0987654
2016-10-16 20:46:38.662 Assignment3[29200:733345] Do you wish to continue 1-CONTINUE/0 - EXIT
1
2016-10-16 20:46:40.486 Assignment3[29200:733345] 1
2016-10-16 20:46:40.486 Assignment3[29200:733345] 1: Add a Vehicle  2: List Vehicle  3: Search Vehicle 4: Add
Employee 5: List Employees
5
2016-10-16 20:46:43.014 Assignment3[29200:733345] Employee First Name nirmal
2016-10-16 20:46:43.014 Assignment3[29200:733345] Employee Last Nameanand
2016-10-16 20:46:43.014 Assignment3[29200:733345] Employee Citychennai
2016-10-16 20:46:43.015 Assignment3[29200:733345] Employee Address35alwarpetstreet
2016-10-16 20:46:43.015 Assignment3[29200:733345] Employee Phone6178168125
2016-10-16 20:46:43.015 Assignment3[29200:733345] Employee Zipcode02120
2016-10-16 20:46:43.015 Assignment3[29200:733345] Employee SSN0987654
2016-10-16 20:46:43.015 Assignment3[29200:733345] Do you wish to continue 1-CONTINUE/0 - EXIT
```

Screenshot 4

Validation of Dealer

```
2016-10-16 20:53:10.853 Assignment3[29306:736831] Enter the Dealer Details
2016-10-16 20:53:10.855 Assignment3[29306:736831] Dealer Name(Only Alphabets):
Dealer1
2016-10-16 20:53:17.931 Assignment3[29306:736831] Dealer Phone No(Only Numbers up to 10 digits
dealer
2016-10-16 20:53:24.971 Assignment3[29306:736831] Dealer City(Only Alphabets):
bos
2016-10-16 20:53:27.659 Assignment3[29306:736831] Dealer Address(Only Alphanumeric
Tring
2016-10-16 20:53:31.087 Assignment3[29306:736831]  Error !! Enter only alphabets for Department Name
Program ended with exit code: 0
```

```
2016-10-16 20:54:06.873 Assignment3[29322:737393] Enter the Dealer Details
2016-10-16 20:54:06.874 Assignment3[29322:737393] Dealer Name(Only Alphabets):
Deler
2016-10-16 20:54:14.427 Assignment3[29322:737393] Dealer Phone No(Only Numbers up to 10 digits
poi
2016-10-16 20:54:17.683 Assignment3[29322:737393] Dealer City(Only Alphabets):
boston
2016-10-16 20:54:20.356 Assignment3[29322:737393] Dealer Address(Only Alphanumeric
address
2016-10-16 20:54:22.911 Assignment3[29322:737393] Error !! Enter only 10 digit Nos for Phone no
Program ended with exit code: 0
```

Validation of Departments

```
2016-10-16 20:55:04.563 Assignment3[29337:737976] Enter the Dealer Details
2016-10-16 20:55:04.564 Assignment3[29337:737976] Dealer Name(Only Alphabets):
hotwire
2016-10-16 20:55:07.835 Assignment3[29337:737976] Dealer Phone No(Only Numbers up to 10 digits
9876543210
2016-10-16 20:55:11.571 Assignment3[29337:737976] Dealer City(Only Alphabets):
chennai
2016-10-16 20:55:17.571 Assignment3[29337:737976] Dealer Address(Only Alphanumeric
34alarpetstreet
2016-10-16 20:55:41.982 Assignment3[29337:737976] Enter the Department Details
2016-10-16 20:55:41.982 Assignment3[29337:737976] Department Name(Only Alphabets):
9876
2016-10-16 20:55:47.291 Assignment3[29337:737976] Phone No(Only Numbers up to 10 digits
iop
2016-10-16 20:55:50.795 Assignment3[29337:737976]  Error !! Enter only alphabets for Department Name
Program ended with exit code: 0
```

Steps to Run the Code:

Step 1: Unzip the Application

Step 2: Double click on NirmalAnand_kuzhandaivel_Assignment3→ Assignment3.xcodeproj

Step 3: Run the project