

Document1 - Microsoft Word (Product Activation Failed)

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4 Object-oriented programming is one programming paradigm.

(a) Explain the difference between a class and an object. [4]

(b) The following scenario is to be implemented with object-oriented programming.
A library has resources (RESOURCE) available for lending out to borrowers. Resources include books (BOOK), and recordings (RECORDING). Recordings are available for either films (FILM) or music (MUSIC) CDs.

Data stored will include:

- library ID for every item
- author for books
- release date for music CDs and films
- title for every available item
- number of tracks for CDs
- running time for films
- whether or not on loan

Complete the class diagram showing the classes and properties only for the data given above.

RESOURCE
LibraryID: INTEGER

[8]

(c) Explain what is meant by encapsulation. [2]

|

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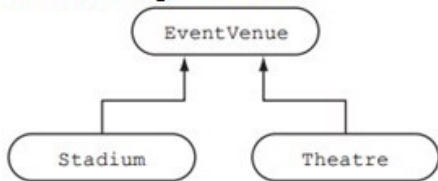
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3 An application is to be implemented. An object-oriented programming (OOP) language will be used.

(a) Explain how OOP uses classes and objects.

[3] (b) An application is to store and process data for major event venues. Venues include football and cricket stadia and theatres. Three classes are to be designed as shown by the inheritance diagram below.



```

graph BT
    Stadium --> EventVenue
    Theatre --> EventVenue
  
```

Explain what is meant by inheritance.

[2]

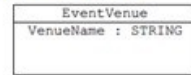
(c) All venues have the venue name and address recorded.

A theatre has recorded:

- the number of seats
- a list of the types of event staged (such as play, rock concert)
- whether or not the theatre has a restaurant.

- a list of the names of any teams that play their home fixtures here
- the capacity
- whether the stadium is 'seating-only'.

(i) Complete the class diagram showing the classes and properties given. Do not attempt to include any methods on the class diagram.

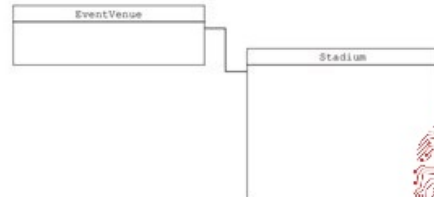


[8]

(ii) The following data is for one such venue.

Stadio Olimpico is in Rome, Italy. It is the home venue for two football teams, Lazio and Roma. The stadium is seating-only and has a capacity of 80,000. It is also used for rugby matches by the national team. |

Complete the object diagram below.




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4 A sports club stores data about its members. A program is to be written using an object-oriented programming language.

A Member class is designed. Two subclasses have been identified:

- FullMember
- JuniorMember

(a) Draw an inheritance diagram for these classes. [3]

(b) The design for the Member class consists of properties

- MemberName
- MemberID
- SubscriptionPaid

methods

- SetMemberName
- SetMemberID
- SetSubscriptionPaid


Write program code for the class definition of the superclass Member. [5]

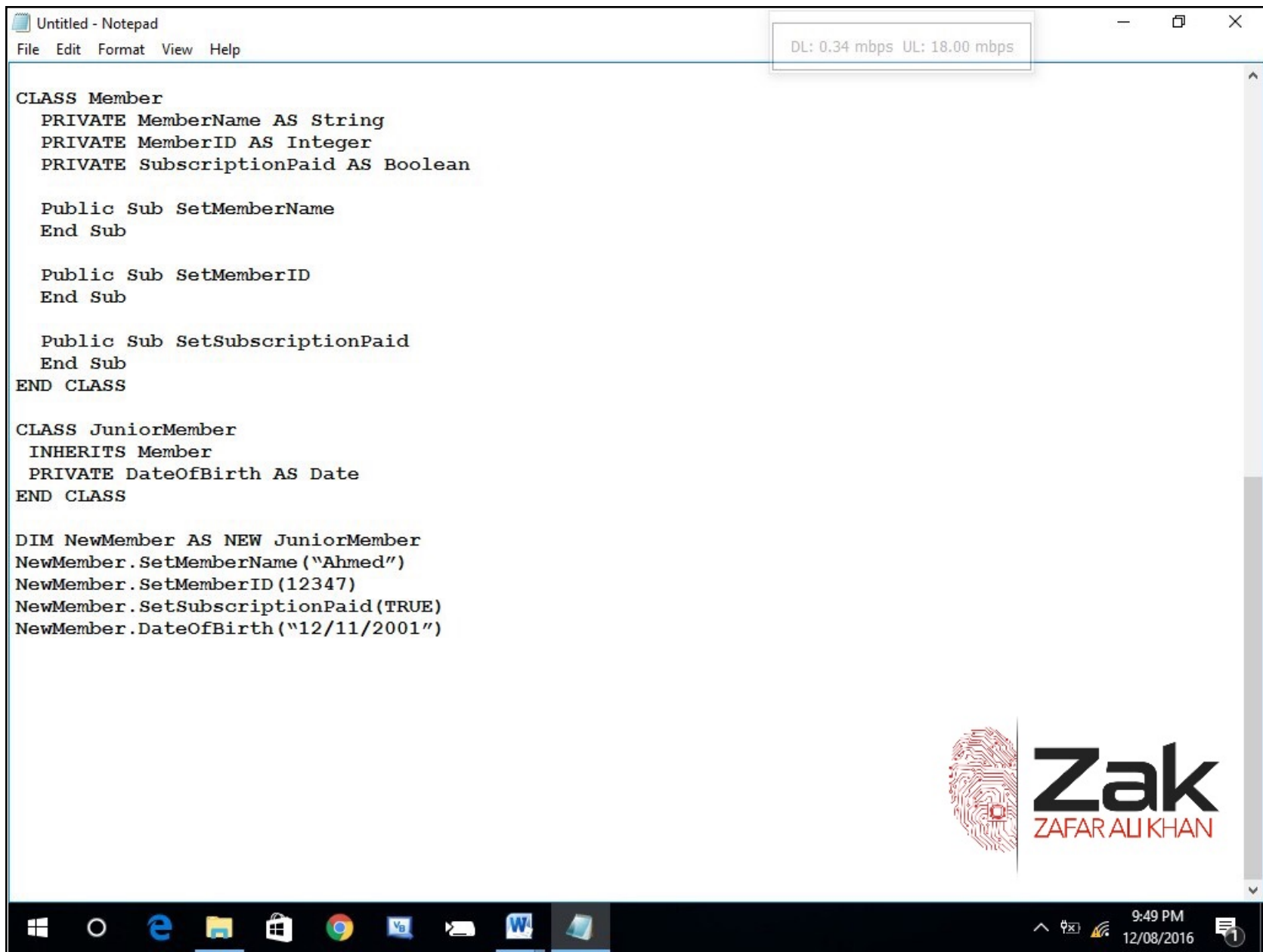
(c) Additionally a DateOfBirth property is required for the JuniorMember class.

(i) Write program code for the class definition for the subclass JuniorMember. [3]

(ii) Write program code to create a new instance of JuniorMember. Use identifier NewMember with the following data:

name Ahmed with member ID 12347, born on 12/11/2001, who has paid his subscription. [3]





The screenshot shows a Windows desktop environment. A Notepad window titled 'Untitled - Notepad' is open, displaying VBA code. The code defines a 'Member' class with private attributes 'MemberName' (String), 'MemberID' (Integer), and 'SubscriptionPaid' (Boolean). It includes three public subroutines: 'SetMemberName', 'SetMemberID', and 'SetSubscriptionPaid'. Below the class definition, a 'JuniorMember' class is defined, inheriting from 'Member' and adding a private attribute 'DateOfBirth' (Date). Finally, a variable 'NewMember' is declared as a new 'JuniorMember' object, and its properties are set: 'SetMemberName' to 'Ahmed', 'SetMemberID' to 12347, 'SetSubscriptionPaid' to TRUE, and 'DateOfBirth' to '12/11/2001'. A watermark for 'Zak ZAFAR ALI KHAN' is visible in the bottom right corner of the Notepad window. The Windows taskbar at the bottom shows various application icons and the system clock indicating 9:49 PM on 12/08/2016.

```
CLASS Member
    PRIVATE MemberName AS String
    PRIVATE MemberID AS Integer
    PRIVATE SubscriptionPaid AS Boolean


    Public Sub SetMemberName
    End Sub

    Public Sub SetMemberID
    End Sub

    Public Sub SetSubscriptionPaid
    End Sub
END CLASS

CLASS JuniorMember
    INHERITS Member
    PRIVATE DateOfBirth AS Date
END CLASS

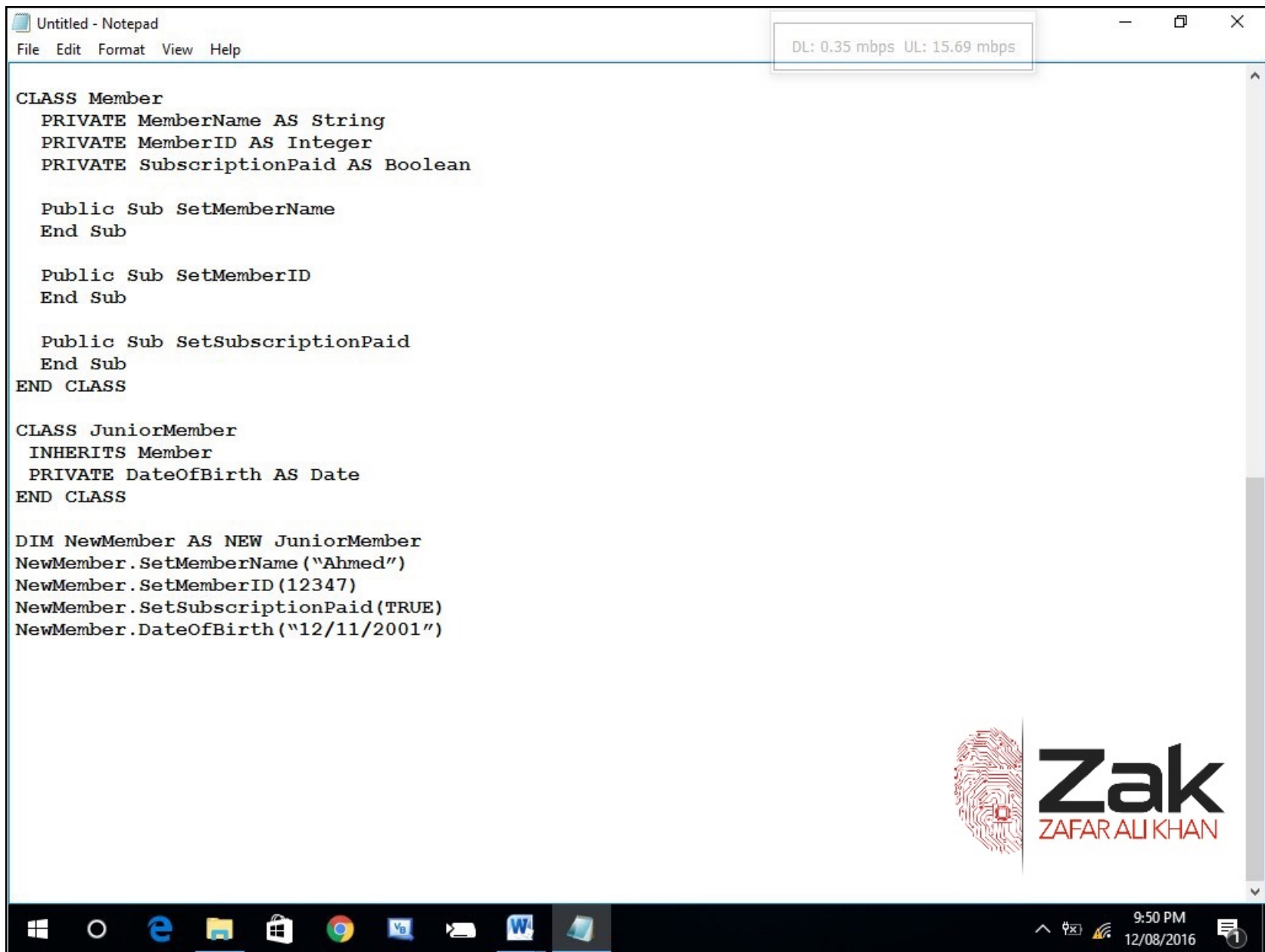
DIM NewMember AS NEW JuniorMember
NewMember.SetMemberName ("Ahmed")
NewMember.SetMemberID (12347)
NewMember.SetSubscriptionPaid (TRUE)
NewMember.DateOfBirth ("12/11/2001")
```

```
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4 A sports club stores data about its members. A program is to be written using an object-oriented
programming language.
A Member class is designed. Two subclasses have been identified:
• FullMember
• JuniorMember
(a) Draw an inheritance diagram for these classes. [3]
(b) The design for the Member class consists of properties
• MemberName
• MemberID
• SubscriptionPaid
methods
• SetMemberName
• SetMemberID
• SetSubscriptionPaid
Write program code for the class definition of the superclass Member. [5]
(c) Additionally a DateOfBirth property is required for the JuniorMember class.
(i) Write program code for the class definition for the subclass JuniorMember. [3]
(ii) Write program code to create a new instance of JuniorMember. Use identifier NewMember with
the following data:
name Ahmed with member ID 12347, born on 12/11/2001, who has paid his subscription. [3]

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```



The screenshot shows a Windows desktop environment. A Notepad window titled 'Untitled - Notepad' is open, displaying VBA code. The code defines two classes: 'Member' and 'JuniorMember'. The 'Member' class has three private attributes: 'MemberName' (String), 'MemberID' (Integer), and 'SubscriptionPaid' (Boolean). It includes three public subroutines: 'SetMemberName', 'SetMemberID', and 'SetSubscriptionPaid'. The 'JuniorMember' class inherits from 'Member' and adds a private attribute 'DateOfBirth' (Date). Below the class definitions, there is a declaration 'DIM NewMember AS NEW JuniorMember' followed by four lines of code that set the properties of 'NewMember': 'SetMemberName' to 'Ahmed', 'SetMemberID' to 12347, 'SetSubscriptionPaid' to TRUE, and 'DateOfBirth' to '12/11/2001'. In the bottom right corner of the Notepad window, there is a watermark consisting of a red fingerprint icon and the text 'Zak ZAFAR ALI KHAN'. The Windows taskbar is visible at the bottom, showing icons for the Start menu, Internet Explorer, File Explorer, and several other applications. The system clock in the bottom right corner indicates the time is 9:50 PM on 12/08/2016.

```
CLASS Member
    PRIVATE MemberName AS String
    PRIVATE MemberID AS Integer
    PRIVATE SubscriptionPaid AS Boolean

    Public Sub SetMemberName
    End Sub

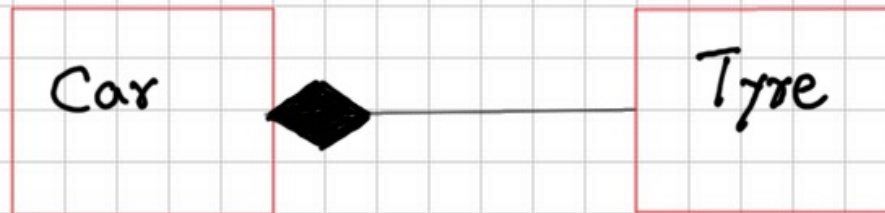
    Public Sub SetMemberID
    End Sub

    Public Sub SetSubscriptionPaid
    End Sub
END CLASS

CLASS JuniorMember
    INHERITS Member
    PRIVATE DateOfBirth AS Date
END CLASS

DIM NewMember AS NEW JuniorMember
NewMember.SetMemberName ("Ahmed")
NewMember.SetMemberID (12347)
NewMember.SetSubscriptionPaid (TRUE)
NewMember.DateOfBirth ("12/11/2001")
```

Containment (Aggregation):



Public Class Car

{
Private myTyres(4) AS Tyre

}
End Class

Public Class Tyre

{

}
End Class



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