

Document1 - Microsoft Word (Product Activation Failed)

DL: 0.11 mbps UL: 3.83 mbps

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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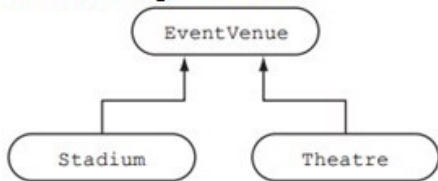
DL: 13.6 kbps UL: 15.5 kbps

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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.



```

classDiagram
    class EventVenue
    class Stadium
    class Theatre
    EventVenue <|-- Stadium
    EventVenue <|-- Theatre
  
```

Explain what is meant by inheritance.

**[2]**

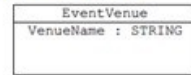
(c) All venues have the venue name and address recorded.

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.

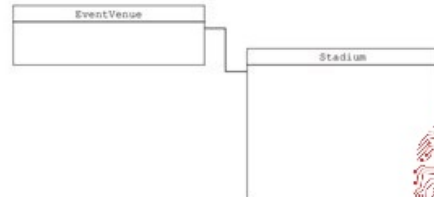


**[8]**

(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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DL: 25.02 mbps UL: 4.86 mbps

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]

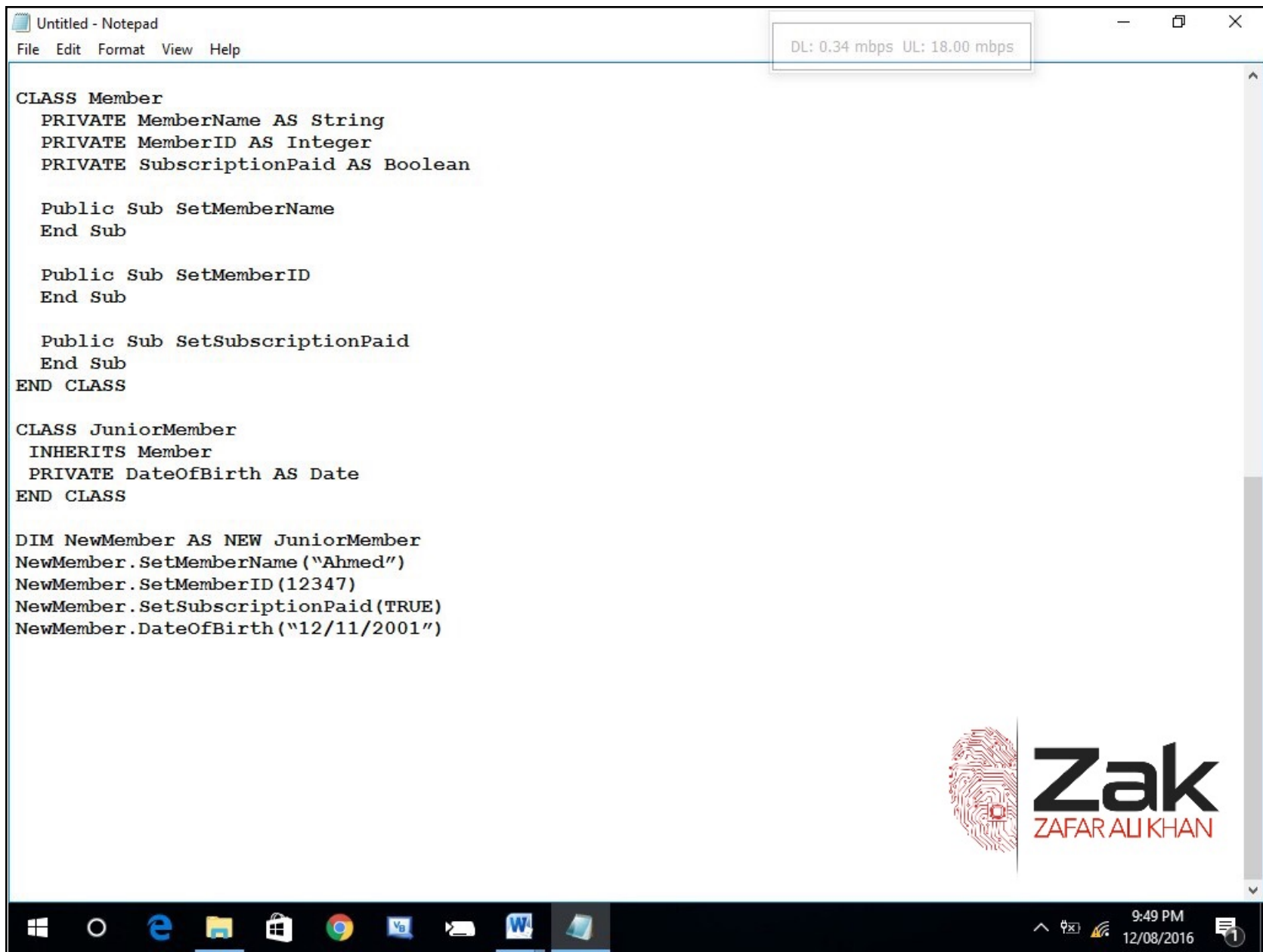
(ii) Write program code to create a new instance of JuniorMember. Use identifier NewMember with the following data:

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



Windows taskbar: 9:48 PM 12/08/2016





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'. 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 at the bottom shows various application icons, including the Start button, Internet Explorer, File Explorer, and several instances of Google Chrome. The system clock in the bottom right corner indicates the time is 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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Untitled - Notepad

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DL: 0.34 mbps UL: 11.64 mbps

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.

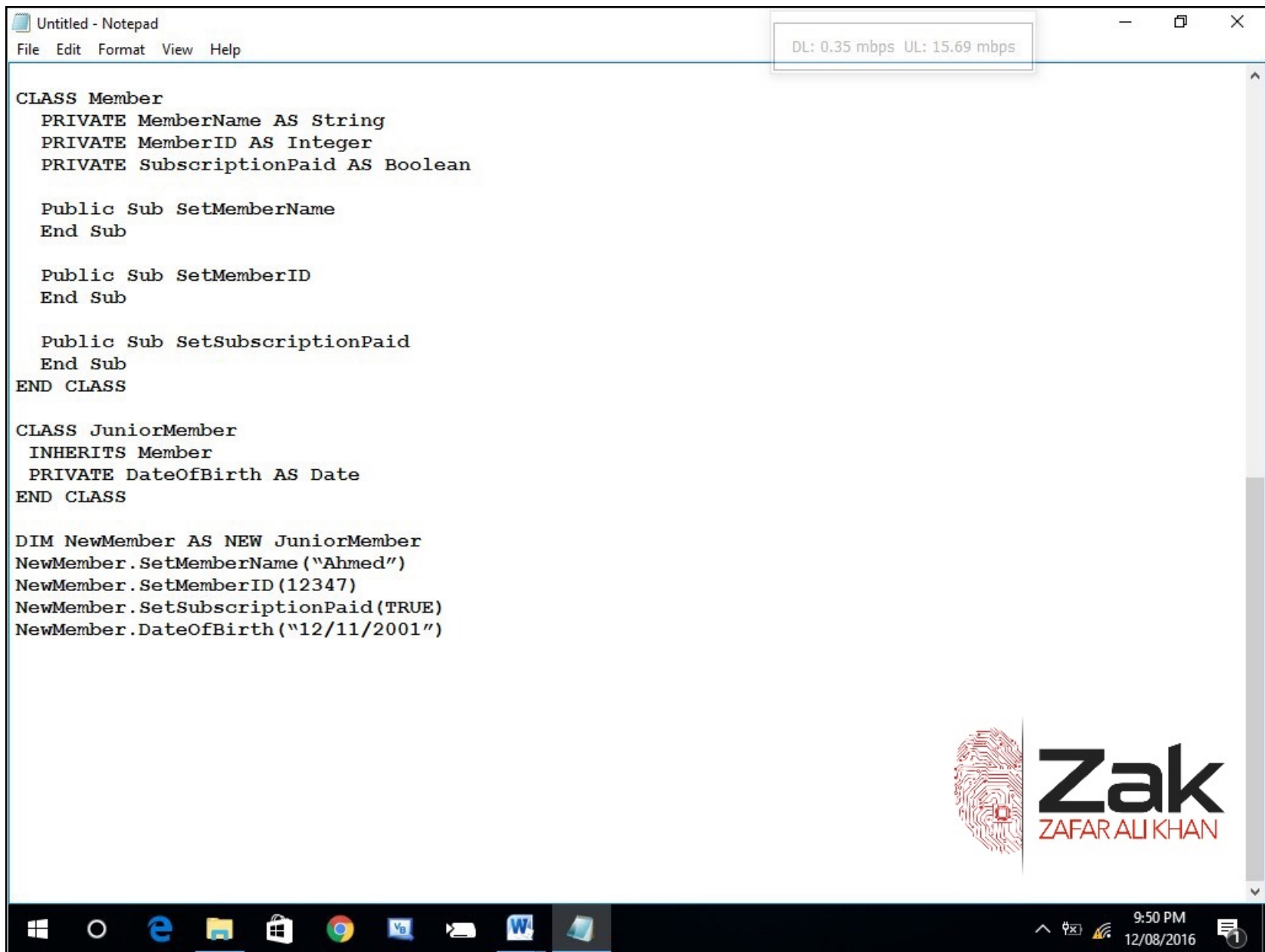
(i) Write program code for the class definition for the subclass JuniorMember. [3]

(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]



Windows taskbar: 9:50 PM 12/08/2016



DL: 0.35 mbps UL: 15.69 mbps

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


    Public Sub SetMemberName
    End Sub

    Public Sub SetMemberID
    End Sub

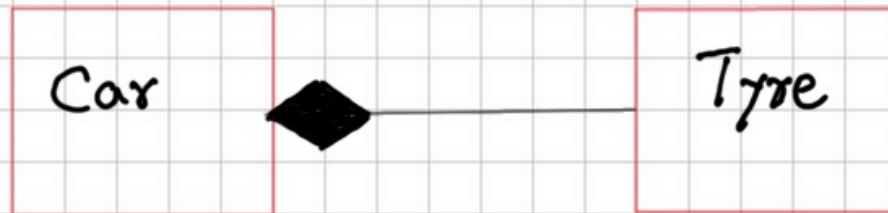
    Public Sub SetSubscriptionPaid
    End Sub
END CLASS

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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## Containment (Aggregation):



Public Class Car

{  
Private myTyres(4) AS Tyre

}

End Class

Public Class Tyre

{

}

End Class



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