







## Syllabus Content:

### 4.2 Algorithm design methods




#### 4.2.2 Jackson Structured Programming (JSP)

-  construct a JSP structure diagram showing repetition
-  construct a JSP structure diagram showing selection
-  write equivalent pseudocode from such structure charts
-  construct a JSP structure diagram to describe a data structure
-  construct a JSP data structure diagram:
  - using sequence
  - using selection
  - using iteration
-  construct a JSP diagram for a program design

### 4.2.2 Jackson Structure Programming

When designing a program using **Jackson structured programming (JSP)**, we set up a structure based on the structure of the data the intended program is to handle.

A structure can consist of elementary components (they have no parts) and composite components (sequence, selection or iteration).

-  A sequence has two or more components.
-  Selection consists of two or more parts, only one of which is selected.
-  Iteration consists of one part that repeats zero or more times.

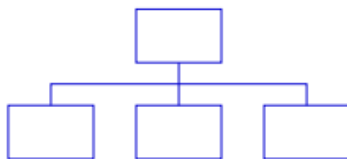
#### Purpose of JSP structure diagrams

#### Jackson Structured Programming (JSP) diagrams

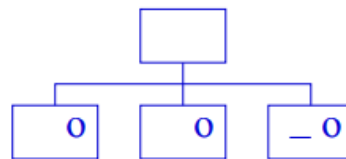
Top-down diagrams in programming are often drawn using Jackson Structured Programming (JSP) diagrams. These seek to break down problems into manageable chunks, to help people better understand a problem and to help them plan a solution.

#### Different symbols inside boxes & how these affect the structure of the program

##### Sequence



##### Selection



##### Iteration



Components of a Jackson structure diagram.

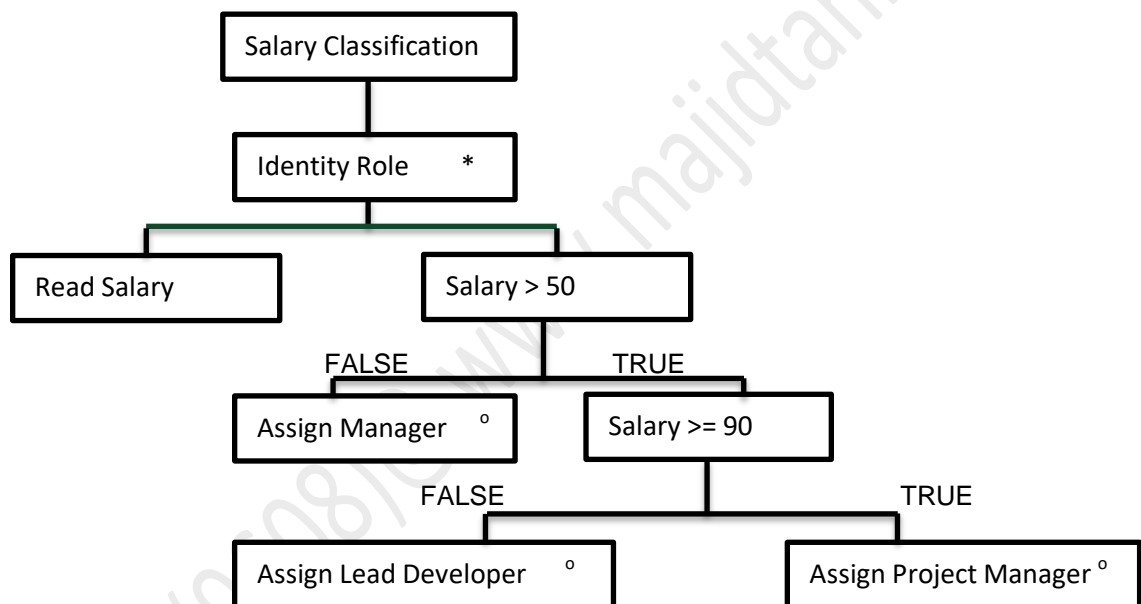
Key focus: Jackson Structure diagrams

TASK 1

Staff salaries are read from a file. The role of each member of staff is determined by their salary:

- If they earn 50 or less, they are **Manager**
- If they earn more than 50 but less than 90 they are **Lead Developer**
- If they earn 90 or more, they are **Project Manager**

The following diagram shows the structure of a solution to this problem



Task: Complete the following Pseudocode algorithm for the JSP structure diagram on the previous page.

Answer:

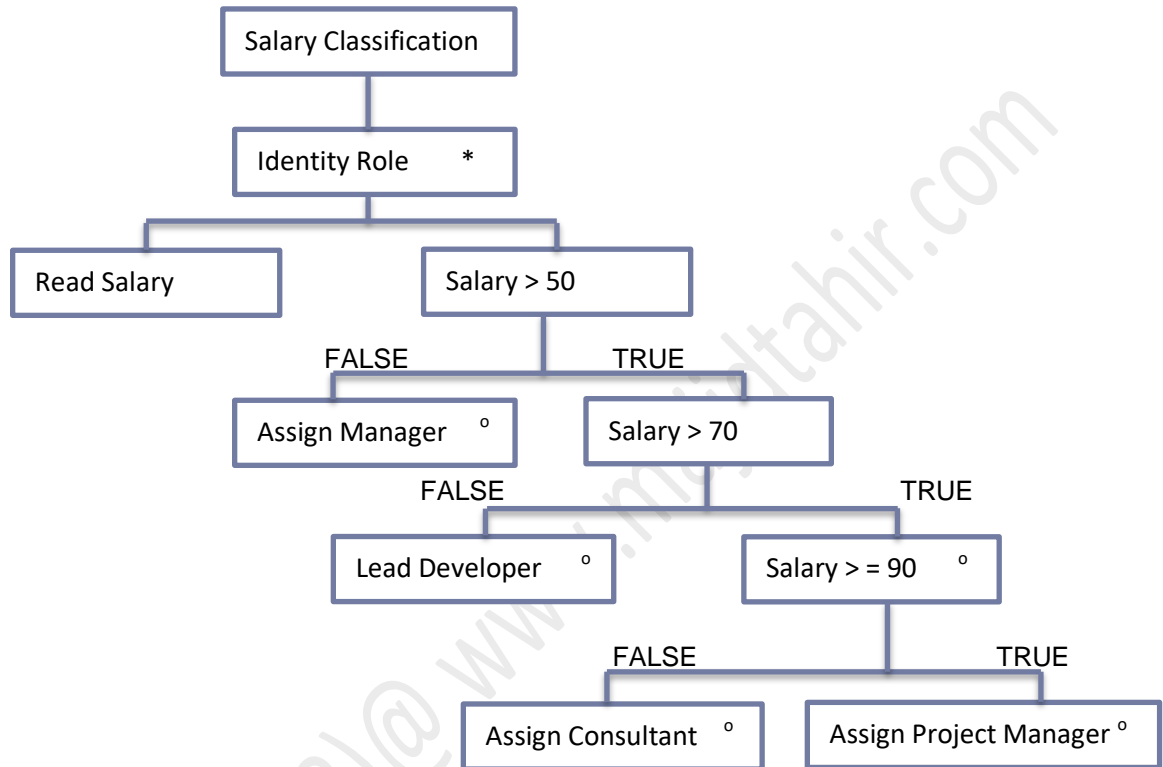
```

WHILE NOT EOF Salary.txt //Staff salaries are read from a file (given in Task1)
    CALL ReadSalary()
    IF Salary > 50
        THEN
            IF Salary >= 90
                THEN
                    Role ← Project Manager
            ELSE
                Role ← Lead Developer
            ENDIF
        ELSE
            Role ← Manager
        ENDIF
    ENDWHILE
    
```

Task1.4: A new role is introduced. Any member earning more than 70 and less than 90 is now called a consultant. Edit the JSP structure diagram to include the Consultant role.

Answer:

### JSP New Structure Diagram



Task 1.5: Edit the Pseudocode algorithm to add the Consultant role.

Answer:

```

WHILE NOT EOF Salary.txt //Staff salaries are read from a file (given in Task1)
    CALL ReadSalary()
    IF Salary > 50
        THEN
            IF Salary > 70
                THEN
                    IF Salary >= 90
                        THEN
                            Role ← Project Manager
                        ELSE
                            Role ← Consultant
                        ENDIF
                    ELSE
                        Role ← Lead Developer
                    ENDIF
                ELSE
                    Role ← Manager
            ENDIF
        ENDIF
    ENDWHILE
    
```

**Task 1.6:** Write a function in **Program code** to determine the role of staff member.  
The function will take salary as its parameter, and return the role title.

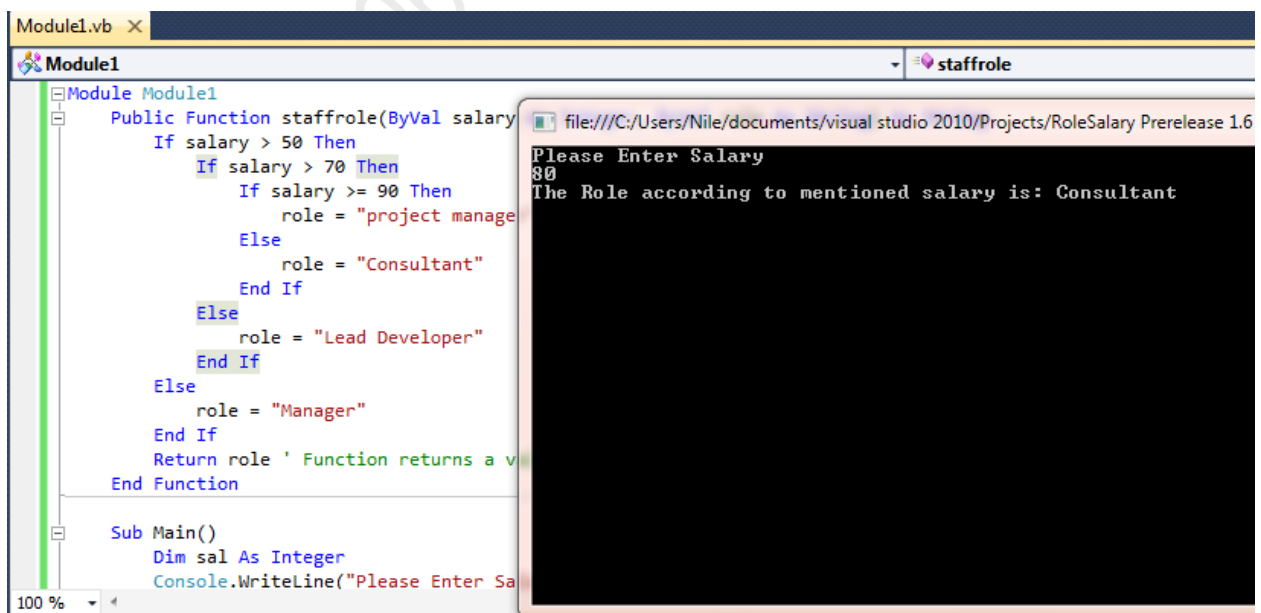
### Answer:

**VB Code (Console Programming)** (Students can copy code in VB and see how program works)

```
Module Module1
    Public Function staffrole(ByVal salary As Integer, ByVal role As String) As String
        If salary > 50 Then
            If salary > 70 Then
                If salary >= 90 Then
                    role = "project manager"
                Else
                    role = "Consultant"
                End If
            Else
                role = "Lead Developer"
            End If
        Else
            role = "Manager"
        End If
        Return role ' Function returns a value
    End Function

    Sub Main()
        Dim sal As Integer
        Console.WriteLine("Please Enter Salary")
        sal = Console.ReadLine()
        Console.WriteLine("The Role according to mentioned salary is" & staffrole(sal,
            role:=sal)) ' call to the function
        Console.ReadKey()
    End Sub
End Module
```

**Screenshot of Output of VB code written above**



**WORKED EXAMPLE 24.02**




**Designing a program using JSP**

Consider a company's order form template:

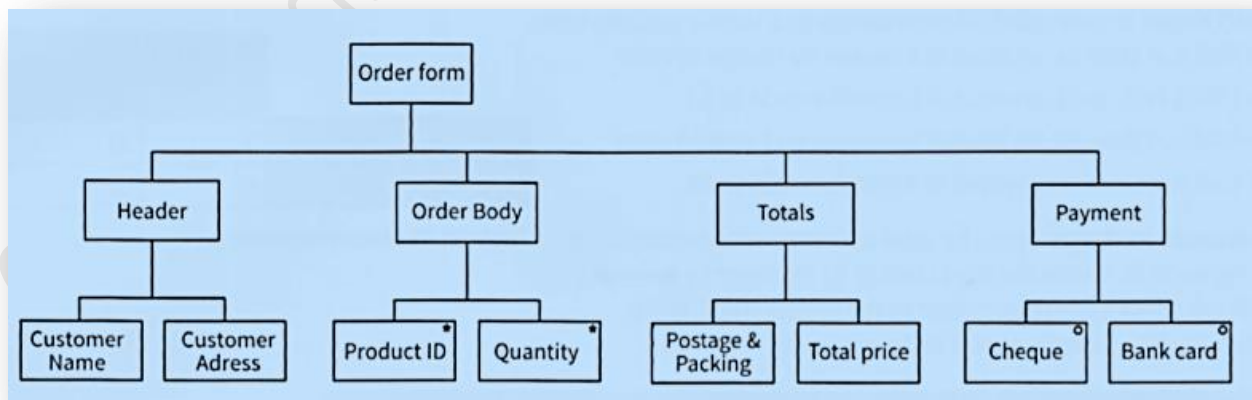
Parts Order Form				
Customer Name:				
Customer Address:				
Product ID	Description	Quantity	Unit Price	Price
Postage & Packing				
Total Price				
Payment by:      Cheque/Bank card      (delete as appropriate)				
Bank Card Number:				

The first stage of designing a program to process the data in this order form is to draw a data structure diagram of the data.

Using the top-down approach, at the top level the order form consists of these components: the header, the order body, the totals and the payment method.

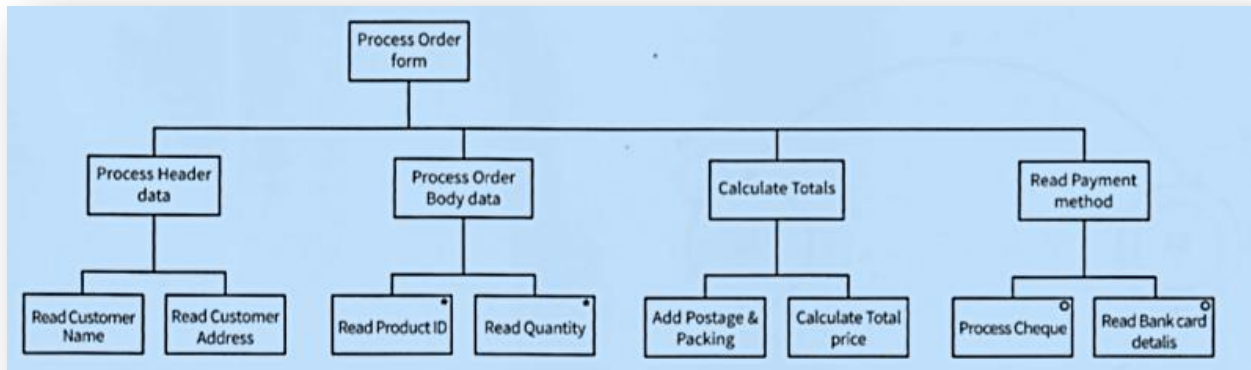
-  The header is a sequence composite component containing customer name and address.
-  The body is an iteration composite component containing repeated products and their quantity, etc.
-  The payment method is a selection composite component containing either cheque or bank card.

**JSP Diagram of Customer Order Form**



**Data structure diagram**

From the data structure diagram, we can draw the **program structure diagram**



**TASK 24.01**

Write pseudocode from the Jackson program structure diagram in Figure 24.04.

References:

- AS & A level Course Book by Sylvia Langfield & Dave Duddell
- A level 9608 Pre-Release material 2018/42 Pastpapers