

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.

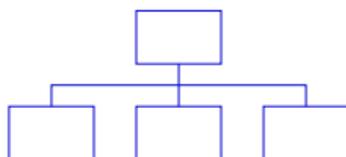
Purpose of JSP structure diagrams

Jackson Structured Programming (JSP) diagrams

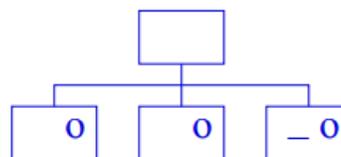
Top-down diagrams in programming are often drawn using Jackson Structured Programming (JSP) diagrams. These seek to break down problems into manageable chunks, to help people better understand a problem and to help them plan a solution.

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

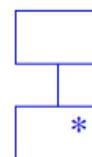
Sequence



Selection



Iteration



Components of a Jackson structure diagram.

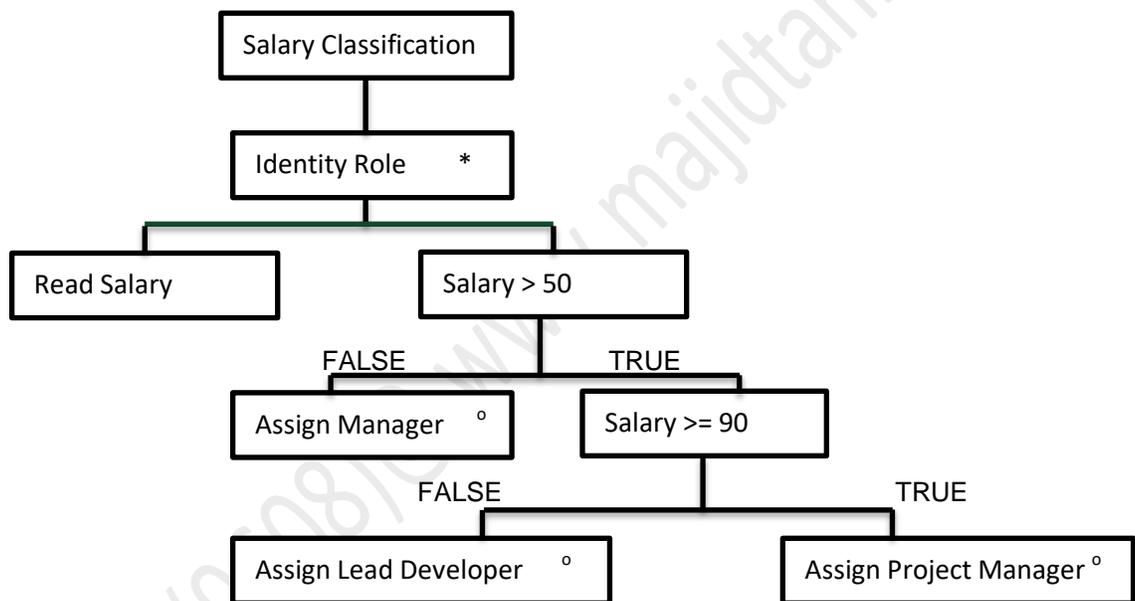
Key focus: Jackson Structure diagrams

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:

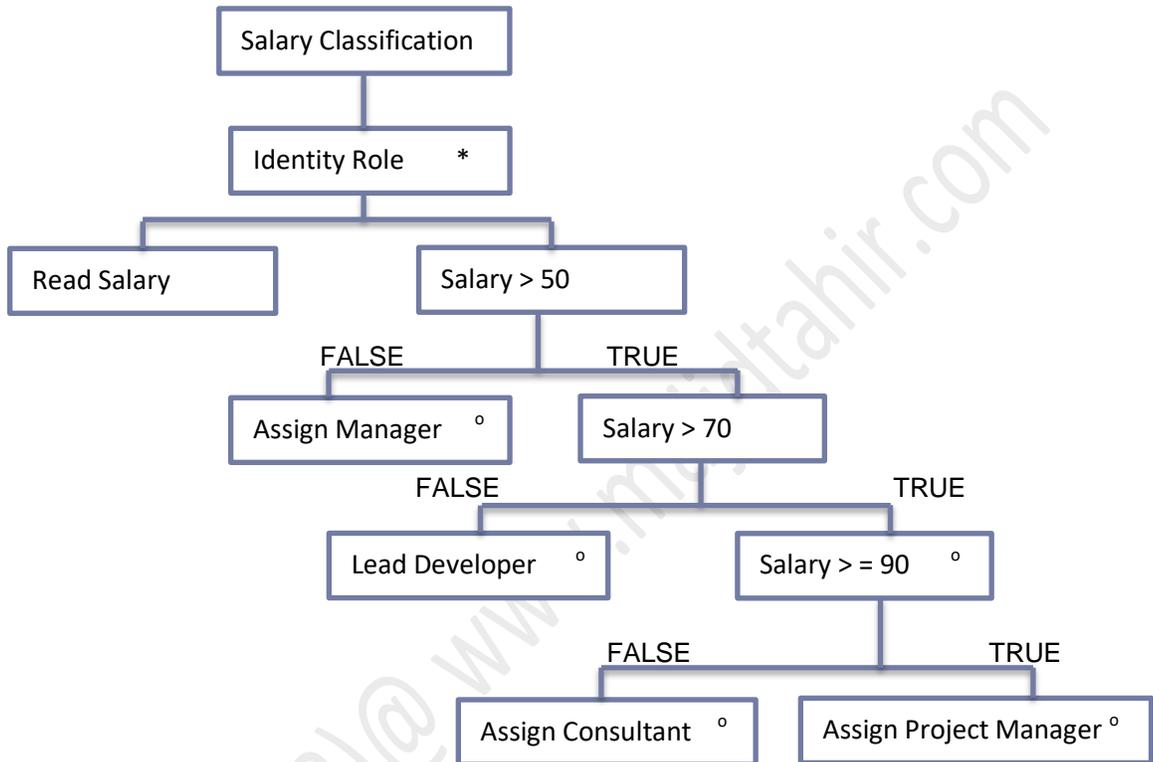
```

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

The screenshot displays the Visual Studio 2010 IDE. On the left, the code editor shows the VB code for Module1, including the staffrole function and the Main sub. On the right, a console window titled 'file:///C:/Users/Nile/documents/visual studio 2010/Projects/RoleSalary Prerelease 1.6' shows the program's execution: 'Please Enter Salary', the user input '80', and the output 'The Role according to mentioned salary is: Consultant'.

WORKED EXAMPLE 24.02

Designing a program using JSP

Consider a company's order form template:

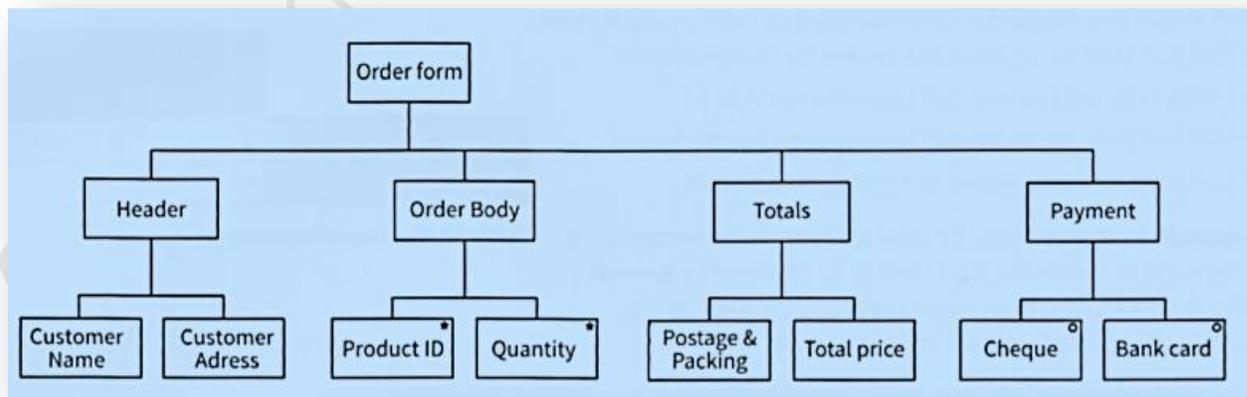
Parts Order Form				
Customer Name:				
Customer Address:				
Product ID	Description	Quantity	Unit Price	Price
Postage & Packing				
Total Price				
Payment by:		Cheque/Bank card (delete as appropriate)		
Bank Card Number:				

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.

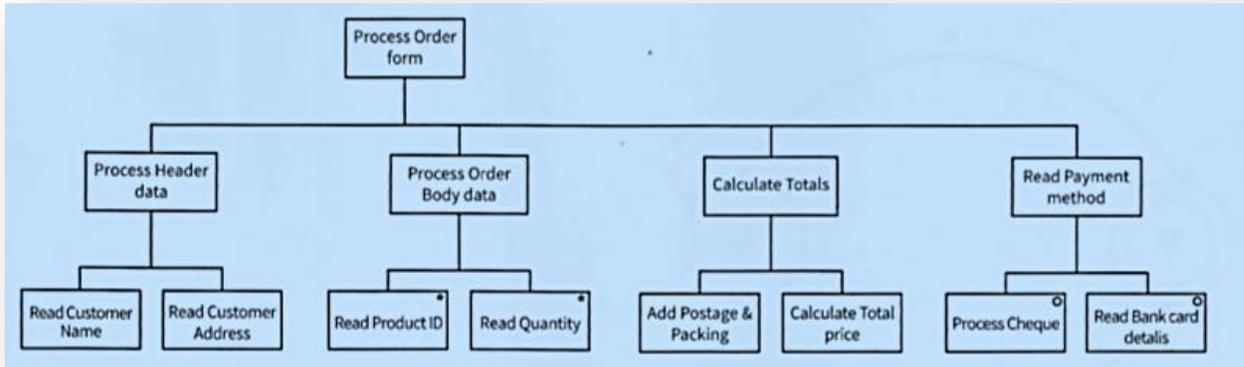
-  The header is a sequence composite component containing customer name and address.
-  The body is an iteration composite component containing repeated products and their quantity, etc.
-  The payment method is a selection composite component containing either cheque or bank card.

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