MAKERERE UNIVERSITY BUSINESS SCHOOL

Bachelor of Business Computing

BUC 2227: Business Application Programming
Lecture 3

The Concept Of Algorithms, Pseudo Codes and Flowcharts

1. Algorithm

- It is a step by step way of executing tasks.
- It refers to a series of tasks to be executed by the computer and the order or sequence in which these tasks are to be executed. Example……
- Students grading program; input marks, grade students basing on marks scored, store marks, print out students results basing on name and regn number etc
- A program algorithm can be represented by either the pseudo code or the flow chart.

2. A Pseudo code

- It is a way of expressing an algorithm using a structured formal language that gives the outline of the program and written in a form that can easily be converted into programming statements.
- A pseudo code can not be compiled or executed.
- E.g. Area of a Triangle = ½ bh

Example for grading system

Example 1

UNEB uses the following logic to grade students:

80>A, 70>B, 60>C, 50>D and <50 Failure.

There are 90,000 candidates who sat for "A" level. Design a program pseudo code and its corresponding flow chart.

Example Psuedo code for the students grading Application

Start

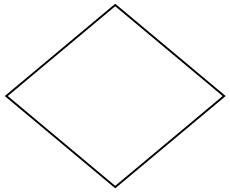
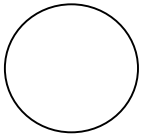
- Open data file for input of students marks
- Read first student's name, 2nd name, school and Index number
- DO WHILE students data exist
- If mark > 80 THEN,
- Grade = A
- Else
- If mark > 70 THEN,
- Grade = B
- Else
- If mark > 60 THEN,
- Grade = C
- Else
- If mark > 50 THEN,
- Grade = D
- Else
- Failure
- End If*4
- Print Student Pass slip and read next student records
- END DO
- Close Students data file

Stop

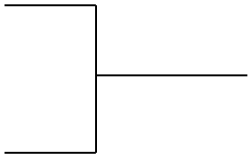
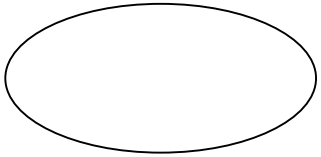
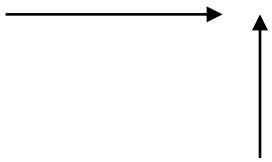
3. Program flow chart

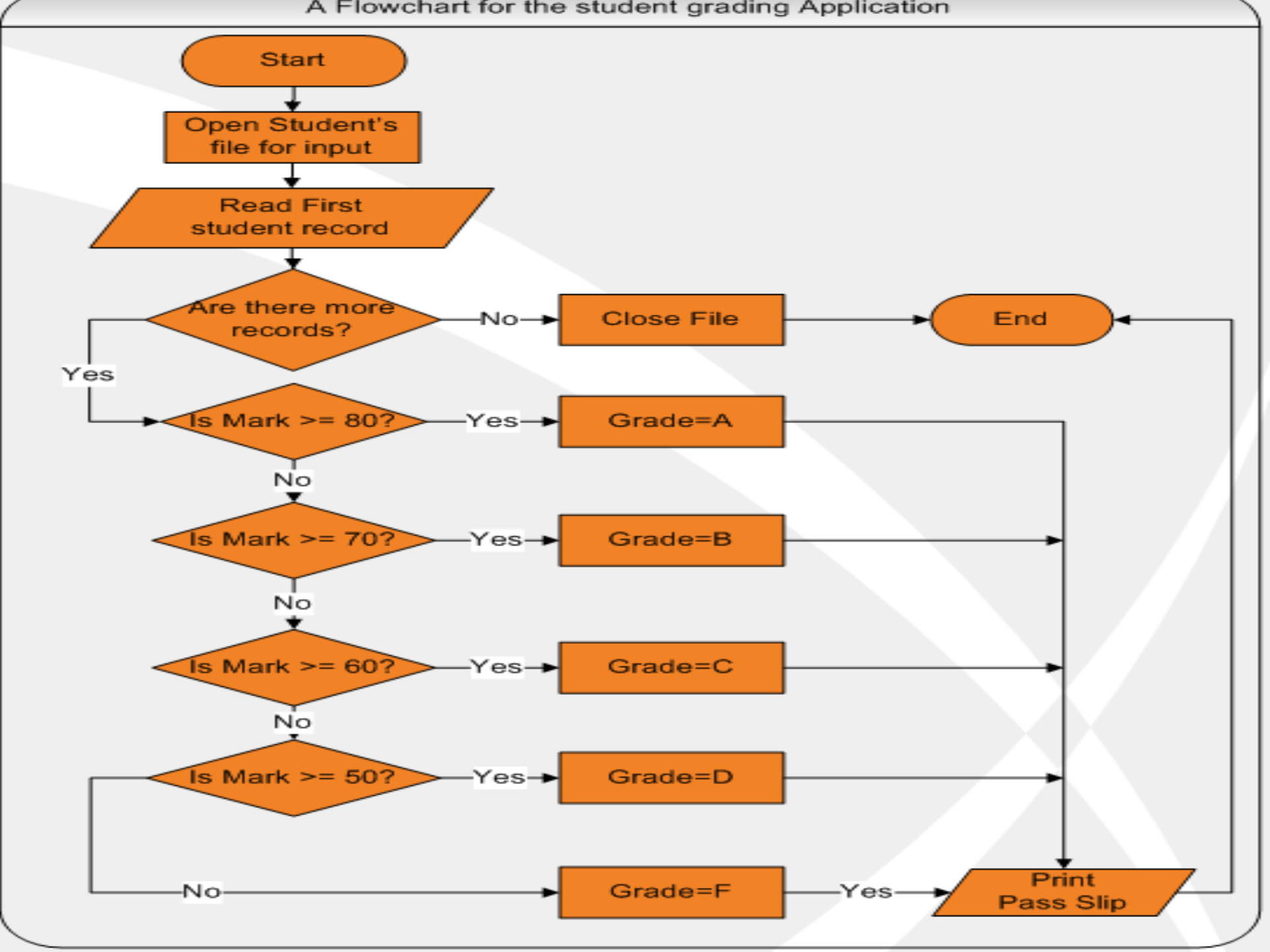
- It is a diagrammatical representation of what is entailed in the program.
- It is a diagram that represents an Algorithm or Process showing the steps as boxes of various kinds, and their order by connecting these with arrows.
- They are used in designing & analyzing a program in software development.
- It makes use of a number of symbols that include;

Common symbols used to draw flow charts

	**Input/output symbol**: This is used to represent any input or output operation. It may represent the point in a program where data (Input) is required or where information is to be displayed.
	**Process symbol**: This symbol represents some type of data manipulation (operation). In the example below, Gross pay is computed by multiplying the hours worked by the pay rate
	**Decision symbol**: It represents a logical comparison operation based on comparison. One of two paths will be taken
	**Connector**: This directs the reader's attention to another area of the flow chart where the program flow continues.

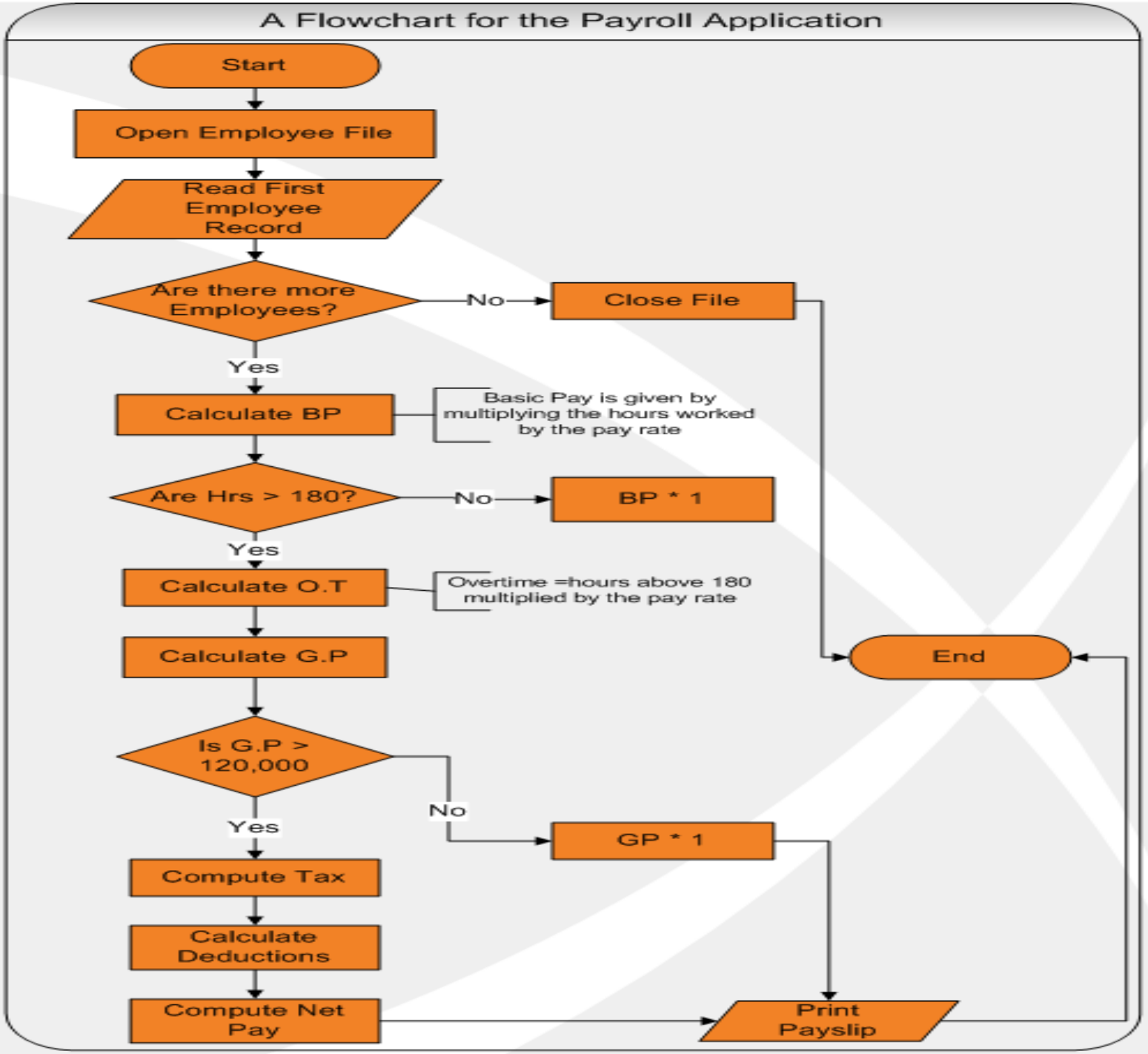
Common symbols used to draw flow charts

	**Predefined process**: This represents a process that is used several times in the same program. This process is defined only once and referenced by this block thereafter.
	**The Annotation flag**: It is used to identify clarifying comments to other symbols. They do not represent a logical step/calculation in the program. They are used only for documentation purposes
	**Start/End/Terminal symbol**: This represents the start or end of the program. It is also used to indicate a program interruption point where information must enter or leave.
	**Direction flow symbol**: This indicates the next step in the program.


A Flowchart for the student grading Application
Start
Open Student's file for input
Read First student record
Are there more records?
No
Close File
End
Yes
Is Mark >= 80?
Yes
Grade=A
No
Is Mark >= 70?
Yes
Grade=B
No
Is Mark >= 60?
Yes
Grade=C
No
Is Mark >= 50?
Yes
Grade=D
No
Grade=F
Yes
Print Pass Slip

Example 2: Psuedocode for the Payroll application

- Start
- Open data file for input of employee personal record
- Read first employee's name, 2nd name, hours worked, the pay rate and account number.
- DO WHILE employee data exists
- Multiply the hours worked by the pay rate
- If hour worked are > 180 THEN,
- Multiply 5000 of the hours worked greater than 180 to get overtime pay. Add overtime pay to Gross pay.
- END IF
- IF Gross pay is>120000 THEN
- Tax rate is 17% of the difference above
- Else
- Gross pay * 1
- END IF
- Calculate the deductions and Net pay
- Print Employees cheque and read next employee records
- END DO
- Close employee data file
- Stop


A Flowchart for the Payroll Application
Start
Open Employee File
Read First Employee Record
Are there more Employees?
No
Close File
Yes
Calculate BP
Basic Pay is given by multiplying the hours worked by the pay rate
Are Hrs > 180?
No
BP * 1
Yes
Calculate O.T
Overtime =hours above 180 multiplied by the pay rate
Calculate G.P
End
Is G.P > 120,000
No
Yes
GP * 1
Compute Tax
Calculate Deductions
Compute Net Pay
Print Payslip

Try out this;

Lecture investigating student's case

- A student calls a lecture telling him that his marks are missing. The lecturer can send away a student without explanation or he can crosscheck students marks in his file. If correct marks exist in his file, he prints and forwards them to the department. However if the marks are not in his file, the lecturer tells the student to re-take a course
- **Required:**
  1) Come up with a psuedo code for the above program
  2) Draw a flowchart to represent the above processes

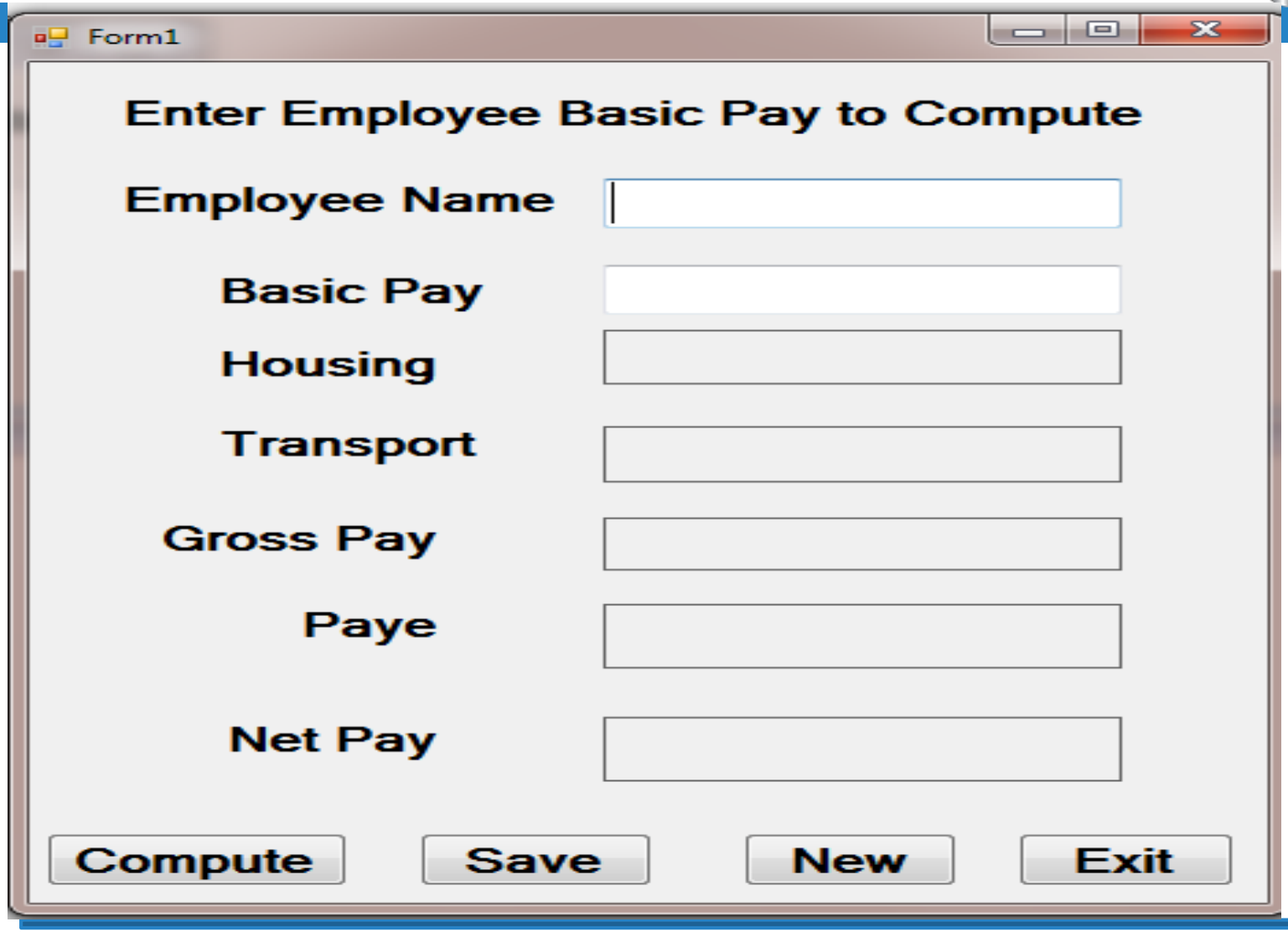
Practical Learning Exercises

Learning Exercise 1

Develop an application that computes an employee's net pay based on the following criteria

- The HR manager enters an employee's name and Basic salary
- Housing allowance is provided as (10% of basic pay)
- Transport allowance is provided as (50% percent of housing allowance)
- If an employee's Gross pay >=1000000, charge PAYE as 10% of Gross pay
  - Else
- The employee doesn't pay PAYE
- Display messages to both categories whether an employee is potential for tax or exempt

Expected Graphical User Interface…

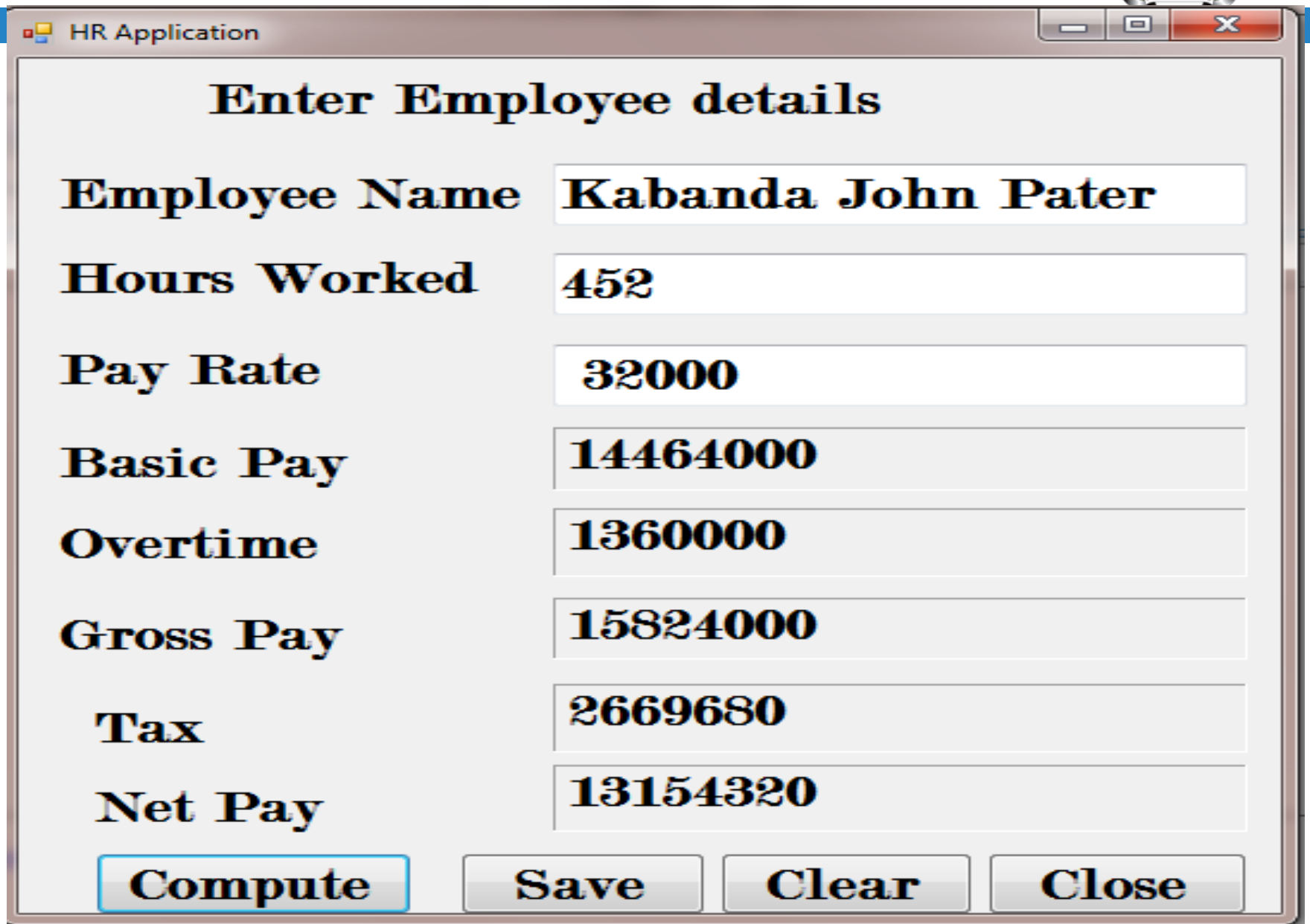


Learning Exercise 2

Develop an HR Application based on the Psuedo code below

- Start
- Open data file for input of employee personal record
- Read first employee's name, 2nd name, hours worked, the pay rate and account number.
- DO WHILE employee data exists
- Multiply the hours worked by the pay rate
- If hour worked are > 180 THEN,
- Multiply 5000 of the hours worked greater than 180 to get overtime pay. Add overtime pay to Gross pay.
- END IF
- IF Gross pay is>120000 THEN
- Tax rate is 17% of the difference above
- Else
- Gross pay * 1
- END IF
- Calculate the deductions and Net pay
- Print Employees cheque and read next employee records
- END DO
- Close employee data file
- Stop

Expected Graphical User Interface...



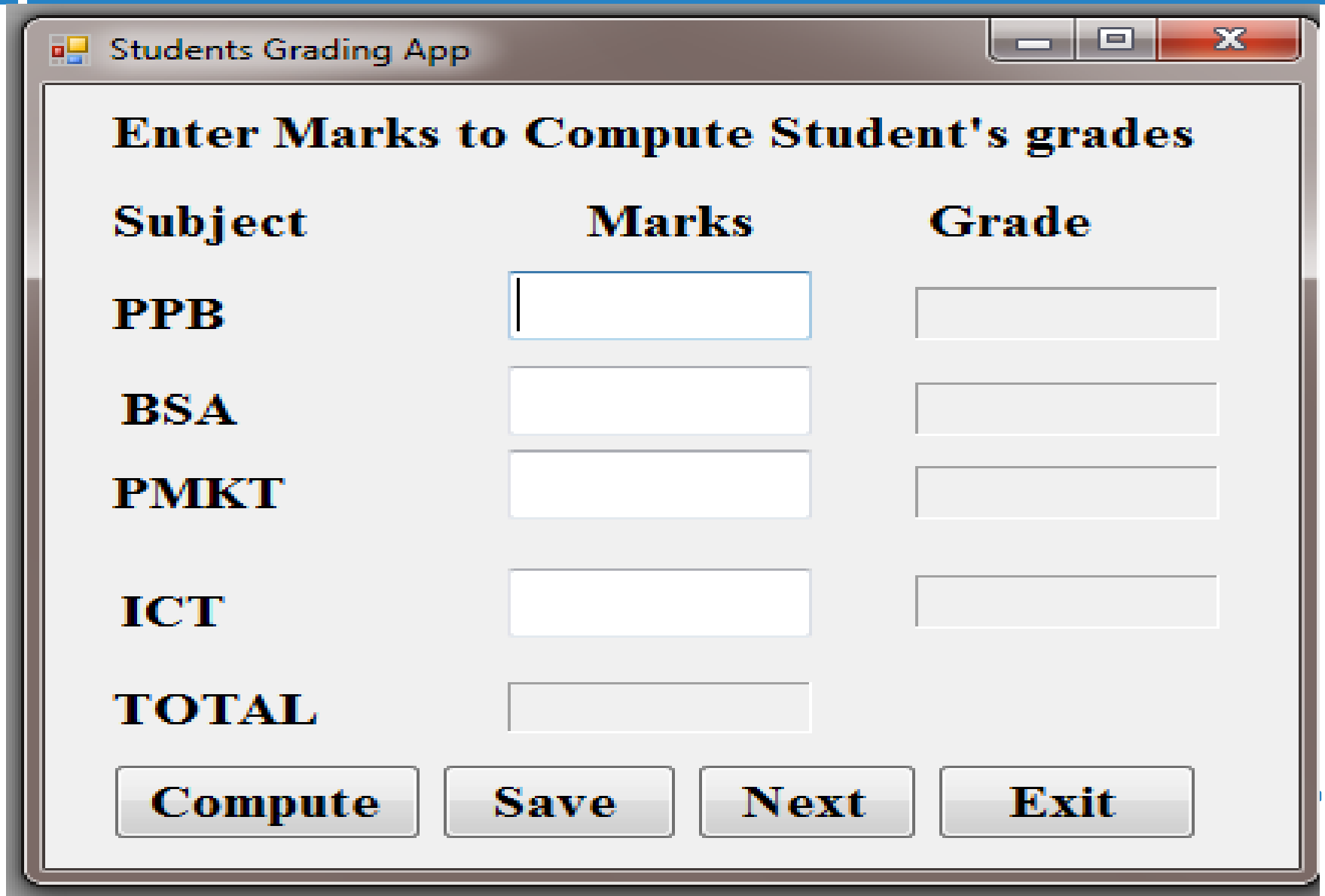
Learning Exercise 3

MUBS grades its students based on the following logic;

Mark	Grade
>=80	A
>=70	B
>=60	C
>=50	D
49 and below	F

There are 20,000 candidates who exams last semester. Using a sample of four course units, develop an application that would prompt a user for input of four subject student marks, compute the total marks and display the grades based on the above logic.

Expected Graphical User Interface...



Next Lecture