PROVINCE OF KWAZULU-NATAL
DEPARTMENT OF EDUCATION

NATIONAL
SENIOR CERTIFICATE

GRADE 12

INFORMATION TECHNOLOGY P1

KZN TRIAL EXAMINATIONS 2015

Marks: 150

Time: 3 hours

This question paper consists of 20 pages

NSC – Grade 12 Preliminary Examination

INSTRUCTIONS AND INFORMATION

1. This question paper contains THREE questions.
2. Answer ALL the questions.
3. The duration of this examination is three hours. Because of the nature of this examination it is important to note that you will not be permitted to leave the examination room before the end of the examination session.
4. This question paper is set in programming terms that are specific to the Java programming language (making use of the Netbeans IDE).
5. Make sure that you answer the questions according to the specifications that are given in each question. Marks will only be awarded based on the set requirements.
6. Only answer what is asked in each question. For example, if the question does not ask for data validation, then no marks will be awarded for data validation.
7. Your programs must be coded in such a way that they will work with any data and not just the sample data supplied or any data extracts that appear in the question paper.
8. Make sure that you develop routines, such as search, sort and selection, from first principles and not use the built-in features of a programming language for any of these routines.
9. You, as the programmer, must define all data structures. You may not use components provided within the user interface to store and later retrieve data.
10. Save your work regularly on the disk (CD/flash disk/DVD, et cetera) that you have been given, or on the disk space allocated to you for this examination.
11. Make sure that your examination number appears as a comment in the first line of code you did to answer a question. Also include the question number as part of the comment.
12. If printouts are required make printouts of the code of all the programs/classes/units that you did and NOT of the code that is generated automatically.
13. Printing must be done after the examination within the timeframe provided for printing.
14. At the end of this examination session, you must hand in the disk/CD with all your work saved on it OR you must make sure that all your work has been saved on the disk space allocated to you. Ensure that all files can be read.
15. You have been supplied with either a disk or disk space containing files you need to complete this question paper.
16. Follow the instructions provided for each question to complete the question paper.

SECTION A

KZN DIGITAL SERVICES is a wholesaler that deals with the sales and distribution of smartphones and other digital devices to all parts of South Africa.

QUESTION 1: GENERAL PROGRAMMING SKILLS

INSTRUCTIONS: The project **Question1** is provided in the **Trial2015** folder.

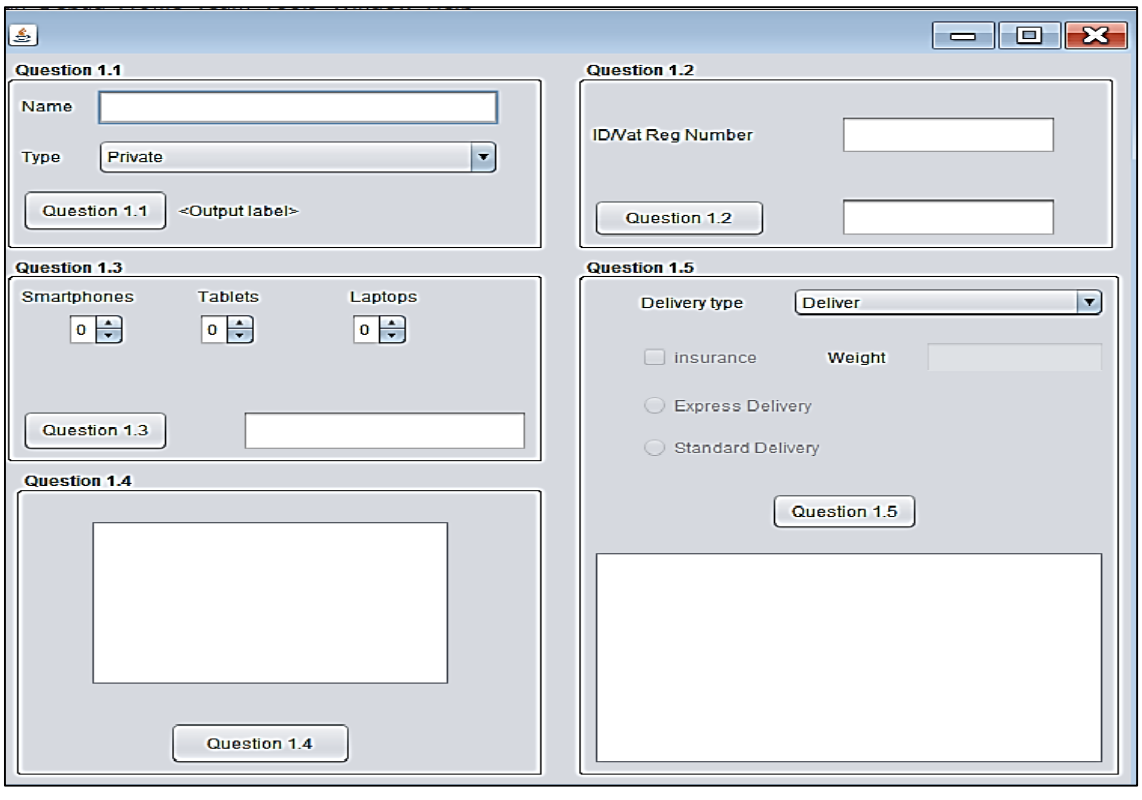
- Open the incomplete class called Question1.java contained in the folder source packages (src), Question1 package.
- Add your name as a comment in the first line of the class Question1.

Do the following:

- Compile and execute the program.
- The interface displays five different sections QUESTION 1.1 to QUESTION 1.5. The program currently has no functionality.
- Complete the code for each section of QUESTION 1 as described in QUESTION 1.1 to QUESTION 1.5 that follows.

Customers can purchase smartphones, laptops and tablets. They are given the opportunity to pay either by cash or pay over a period of time (12 or 24 months) for their purchase. The wholesaler also provides an optional delivery service for their customers.

An example of the graphical user interface (GUI) is given below:

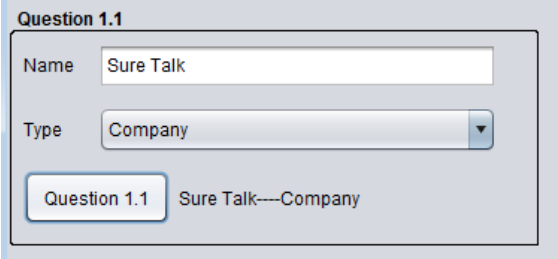


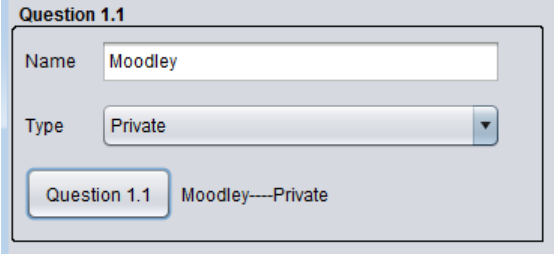
1.1 **Button [Question 1.1]** (3)

A customer can be a company or a private individual.

The user needs to select the word company or private from the combo box and enter his/her name or the company name in the text field provided.

Obtain the type of customer and the name from the provided components. Create and display a line of text as shown in the examples below:





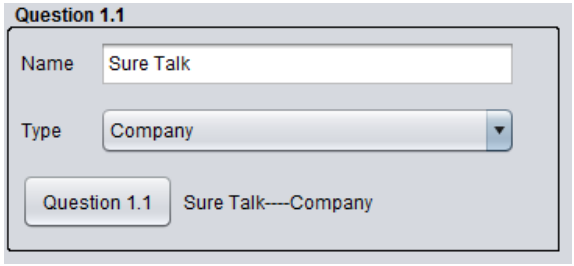
1.2 **Button [Question 1.2]** (10)

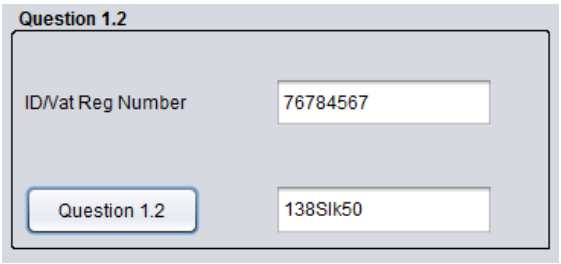
If the customer is a private individual, his/her ID number must be entered in the text field provided; otherwise the company's vat registration number must be entered. Generate an account number for the customer using either the ID number or vat registration number, name and a three digit random number.

The account number must be generated using the following criteria.

- Generate a random three digit number joined to;
- The first character of the private individual's name or the company name joined to;
- The last two characters of the private individual's name or the company name joined to;
- The sum of the digits in the id number or vat registration number.

Display the account number in the text field provided as shown in the example below.





***Note*: The number of digits in a vat registration number may vary.**

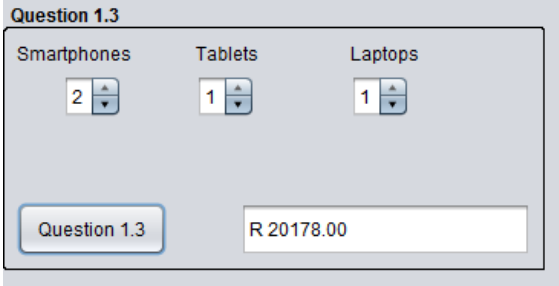
1.3 **Button [Question 1.3]** (12)

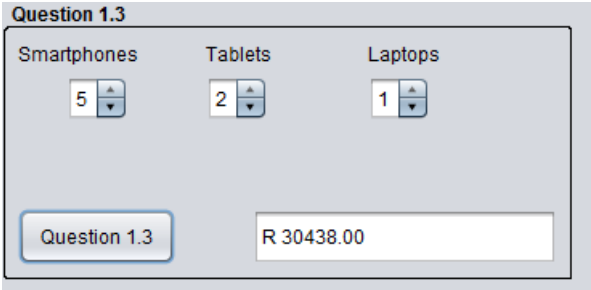
Customers can purchase smartphones, tablets and laptops. Tablets cost R5500 each and Laptops cost R7200 each. The cost of smartphones depends on the quantity purchased. The table below shows the cost per item.

Item	Quantity	Cost
SMARTPHONES	1	R3000 each
	2	R2500 each
	3	R2000 each
	More than 3	R1700 each

Extract the number of smartphones, tablets and laptops purchased from the spinners provided. Write code to calculate and display the Total Cost of the items including VAT (14% of the Total Cost) in the text field provided.

Sample Output





1.4 **Button [Question 1.4]** (8)

Customers can choose to pay for their purchases over a period of twelve months or twenty four months. The monthly installments are calculated using the formula below:

$$\text{Monthly installments} = \frac{Total\ Cost \times (1+0.05 \times n)}{number\ of\ months}$$

Where:

- ***Total Cost*** of the items is determined in question 1.3
- ***n*** – is the number of year(s) - (i.e. The period the customer chooses to pay in years)
- ***number of months*** - the time period the customer chooses to pay.

Write code that would allow the user to enter the number of months from the keyboard and calculate the monthly installments using the algorithm given below:

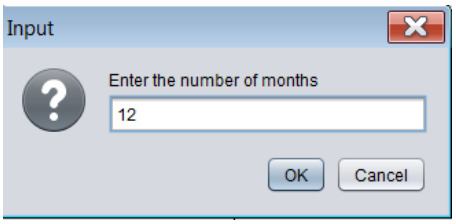
Step 1	Input the number of months from the keyboard until it is either 12 or 24.
Step 2	Multiply the interest rate of 5% to the number of years.
Step 3	Add 1 to the value calculated in step 2.
Step 4	Multiply the value calculated in step 3 by the Total cost of the items purchased in question 1.3.
Step 5	Divide the answer in step 4 by the number of months.
Step 6	Format the value calculated in Step 5 to TWO decimal places.
Step 7	Display the final answer in the text Area provided.

Note: No Marks will be allocated if the given algorithm was not used.

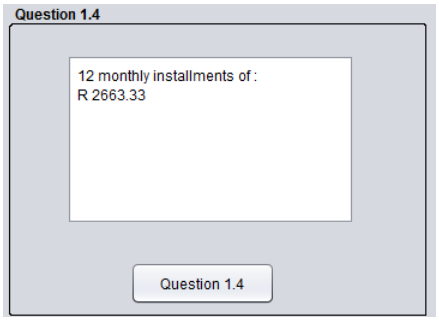
Sample Outputs if Total Cost in 1.3 is R30 438

Sample Output 1

Sample Input:

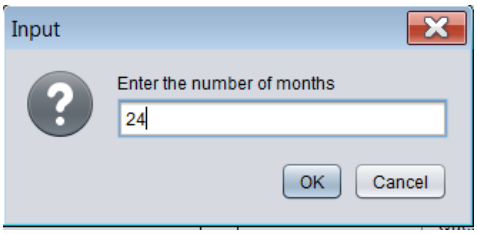


Sample Output

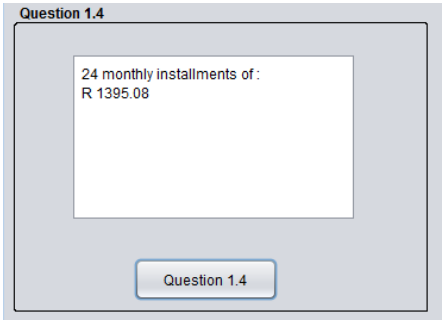


Sample Output 2

Sample Input:



Sample Output



1.5 **Button [Question 1.5]** (15)

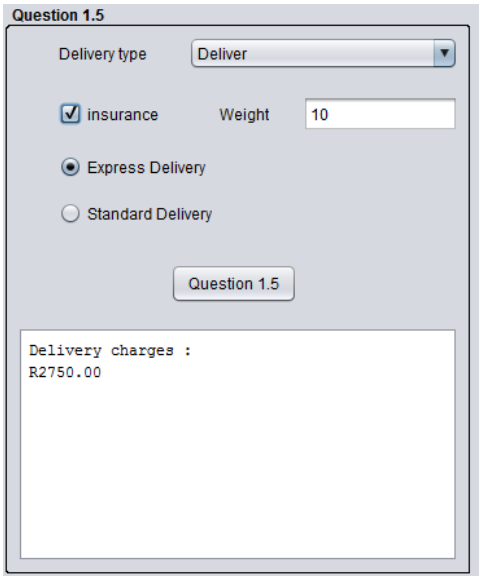
The wholesaler offers a delivery service to their customers. Allow the user to select from the combo box provided: whether the customer wants their items delivered or if they will be picked up by the customer.

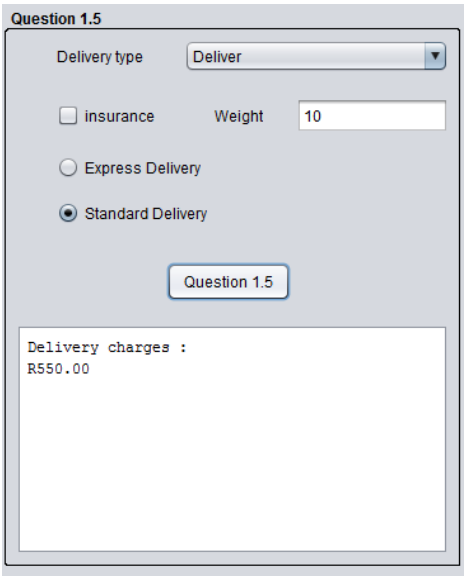
❖ If items are to be delivered, write code to :

- Enable the check box that would provide the option to add insurance of an amount of R2000 to the cost of the delivery.
- Enable the text field and radio buttons in which the weight of the package must be entered and the customer has the option to choose between express delivery and standard delivery.
- Calculate the cost of the delivery if an Express delivery costs R50 per kg and a standard delivery costs R30 per kg.
- Add a compulsory delivery cost of R250.
- Display the cost of the delivery formatted to TWO decimal places.

Sample Input : Total Cost in 1.3 is R30 438

Sample Outputs :

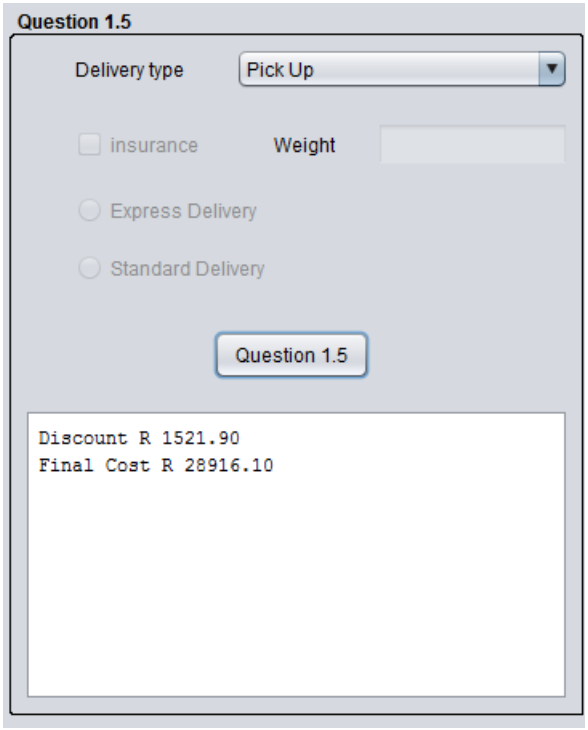




❖ If items are picked up by the customer, they will receive a discount of 5% on their Total Cost determined in Question 1.3. Write code to:

- Calculate and display the discount the customer will receive.
- Calculate and display the Final amount the customer will pay.

Sample Output:



SECTION TOTAL [48]

SECTION B

QUESTION 2: OBJECT-ORIENTATED PROGRAMMING

KZN DIGITAL SERVICES also provides a cellular internet service. This department keeps record of all their customers. Customers can view their account status and purchase data bundles. All overdue accounts are charged a fixed interest on the total amount outstanding.

INSTRUCTIONS:

The project **Question2** is provided for you in the **Trial2015** folder which contains:

- A GUI class file called **Question2.java**
- An incomplete object class file called **Customer.java**
- A text file (**AccountInfo.txt**) that contains information on Customer account and data and airtime balances

- Open the incomplete classes called **Customer.java** and **Question2.java** in the folders **Source Packages (src)**, **Question2Package**.

  Add your full name as a comment in the first line of both **Customer.java** and **Question2.java**

2.1 The given incomplete object class **Customer** contains the declaration of the **six** attributes (in table below) which describes a **Customer** object and some methods:

Name of Attribute	Description
Name	Initial and surname of the customer
idNumber	Identity number of the customer
CellNumber	Cell phone number of the customer
dataBalance	The data balance in megabytes
amountDue	The amount due by the customer
amountDueDate	The due date on which the account should be paid by the customer

Complete the code in the Customer class as described in QUESTION 2.1.1 to QUESTION 2.1.5 that follow:

2.1.1 Write code for a constructor method to receive the name of the customer, identity number, cell phone number, data balance, amount due and the amount due date as parameter values. Assign these values to the relevant attributes of the object class. (3)

2.1.2 Write a method called **overdue** that returns true if the customer's account is overdue, otherwise returns false. (6)

A customer's account is overdue if the following criteria are met:

- If the customer's account balance is positive

- If the customer's due date is greater than the current date.

(Use the system's date function to determine the current date and format the date using the SimpleDateFormat class that is provided)

2.1.3 Write a method called **calcInterest** to calculate and return the interest charged on an overdue account. A 12% per month interest is charged on total amount due by the customer if the customer's account is overdue. (4)

2.1.4 Write a method called **updateDataBalance** that receives the amount of data in gigabytes and the cost of the data as parameters and increases the respective attributes accordingly. (4)

NB: Convert the data to megabytes. 1gigabyte = 1024 megabytes.

2.1.5 Write a **toString** method to return a string which contains the information on a customer in the format shown below. (6)

Name: <Name of the customer> Cell Phone number:<Cell phone number of the customer> Data Balance: < Data balance > Due Date:<Date on which the account should be paid> Amount Due:<Amount due without interest>

The amount must be displayed as currency (rand) to TWO decimal places.

The text file **AccountInfo.txt** contains data needed to compile a report for a customer who has taken a contract with the company.

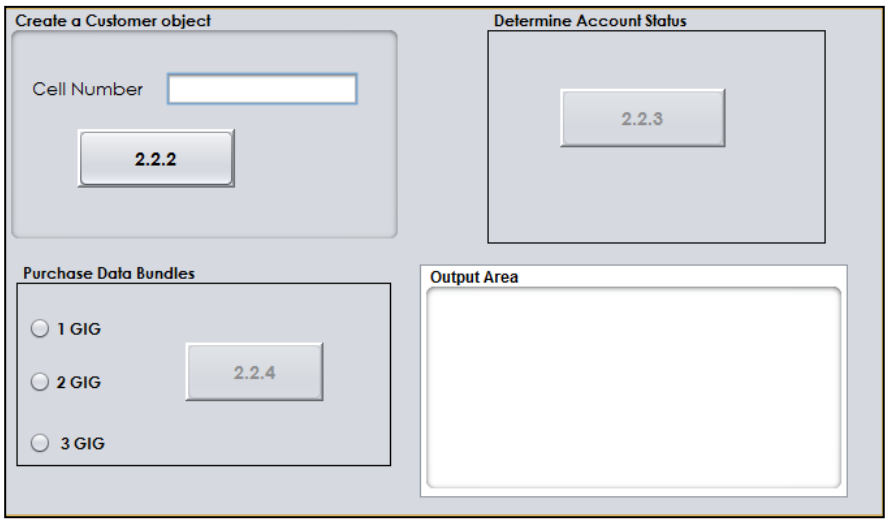
Each line of data in the text file contains data on a single customer in the following format:

<Initial and Surname of customer>#<identity number of customer>;<cell phone number of customer>#<data balance>;<total amount due by the customer excluding interest>;< due date that the customer's account should be paid>

Example of the lines of data stored in the text file:

N Uzumaki#2210191864082;0841833472#31;180.00;2015/09/14 **S Haruno#4908135746085;0845422985#24;757.69;2015/08/2** **S Uchiha#5010204334080;0847849811#37;456.41;2015/09/2** **H Hyuuga#6606171571088;0848784226#462;348.60;2015/08/19** **…**

2.2 An incomplete interface class, **Question2** is supplied. An example of the interface is shown below. Open the class and follow the instructions given below:



2.2.1 Create a global object variable of the **Customer** class. The name of the object variable must be **objCust.** (1)

2.2.2 **Button [2.2.2]** (20)

Obtain the cell phone number of the customer from the text field provided and then validate the cell phone number.

A valid cell phone number consists of 10 digits and the first digit must be 0.

If an invalid cell phone number is entered, a suitable error message must be displayed using the message dialog box. The text field must be cleared and the user must be allowed to re-enter a valid cell phone number.

If the cell phone number is valid, check whether the text file **AccountInfo.txt** exists. Display a suitable message using a message dialog box if the text file does not exist and close the program.

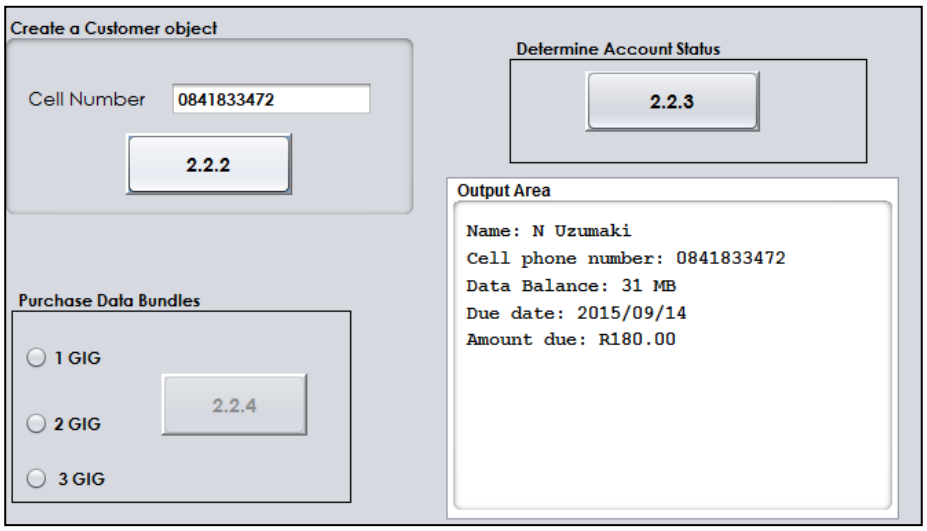
If the text file exists, then use a **conditiona**l loop to search the text file for the cell phone number of the customer that was obtained from the text field.

- ❖ If the cell phone number is found in the text file, then :
  - Use the line of data from the text file that matches the cell phone number to instantiate a new **Customer** object that was declared globally in QUESTION 2.2.1
  - Display the details of the customer using the **toString** method in the output area provided.

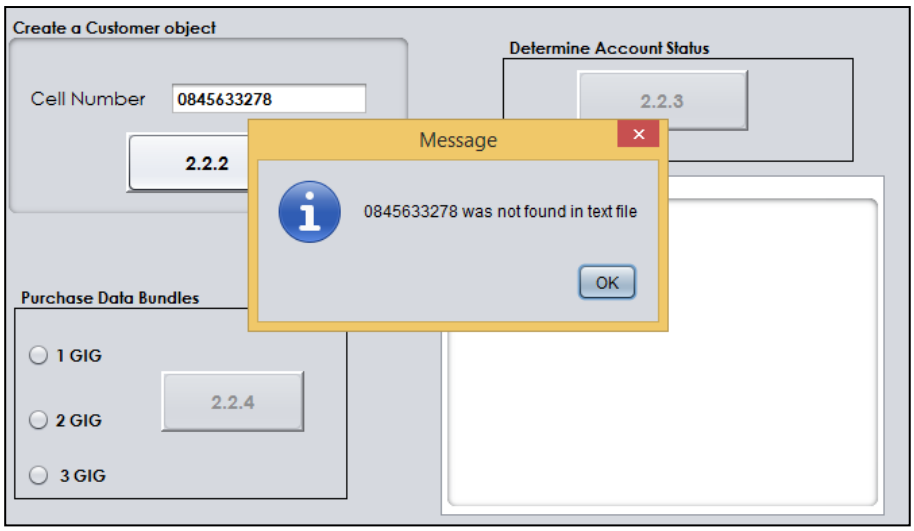
- Enable buttons 2.2.3

❖ If the cell phone number is not found, display a suitable message in a message dialog box.

Example of output if the cell phone number 0841833472 is found in the text file



Example of output if the cell phone number 0845633278 is not found in the text file



2.2.3 **Button [2.2.3]** (11)

If the customer's account is overdue, do the following:

- Create a text file using the name of the customer as the file name.

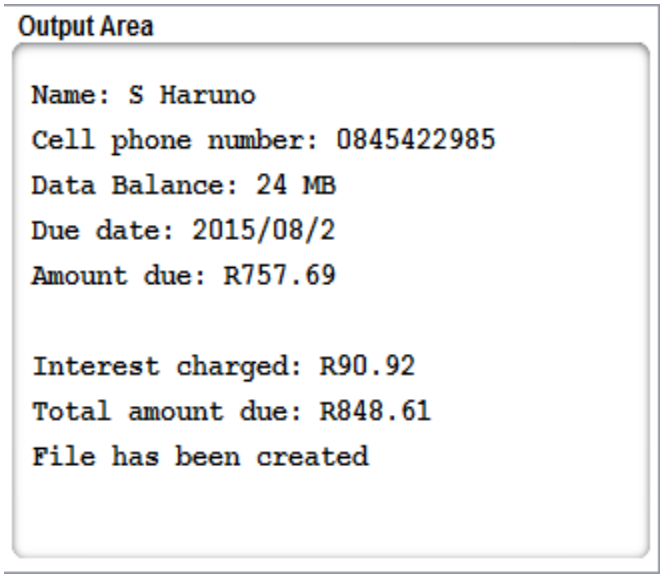
- Write the cell phone number, the amount owing, the interest charged and the total amount due by the customer to the text file in the format shown below:

Cell number : <cellnumber> Amount due : <amountDue> Interest Charged: <interest> Total Amount Due : <Total>

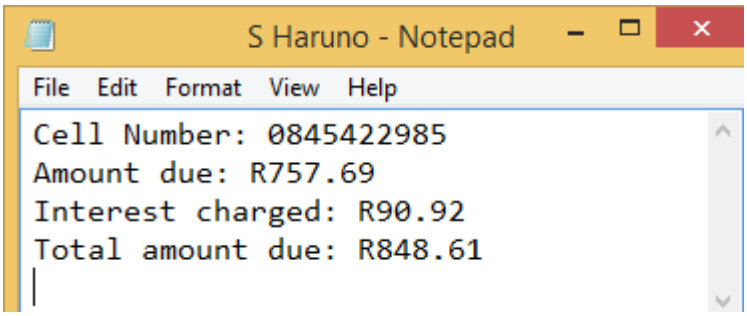
- Use the output area to display the details of the customer using the **toString** method, interest charged, the total amount due by the customer a message to indicate that the file has been created:

  If the account has been paid, use the output area to display the customers details using the **toString** method and the message 'Account not overdue'.

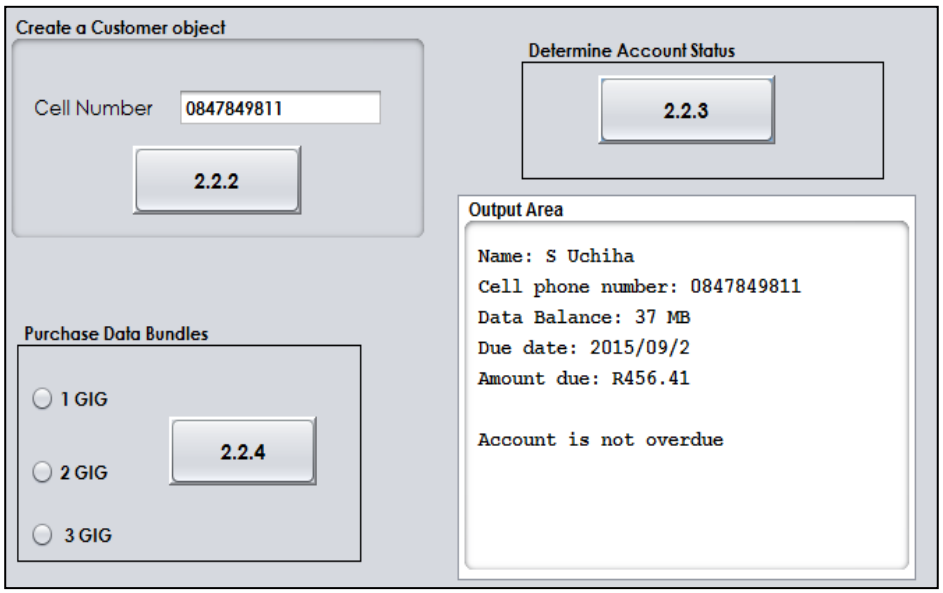
Example of output if the account is overdue for cell phone number 0845422985



Text File Output



Example of output if the account is not overdue for cell phone number 0847849811



2.2.4 **Button [2.2.4]** (7)

The customer is allowed to purchase data bundles during the month.

- 1 gigabyte cost R149.00
- 2 gigabyte cost R249.00
- 3 gigabyte cost R299.00

Write code to allow the customer to select one of the options. Increase the customer's data balance and his amount due. Display the customer's updated details on the output area using the **toString** method.

Example of output after the customer has made a purchase
2 Gigabytes of data with cellphone number 0841833472

Output Area

```
Name: N Uzumaki
Cell phone number: 0841833472
Data Balance: 2079 MB
Due date: 2015/09/14
Amount due: R429.00
```

SECTION TOTAL [62]

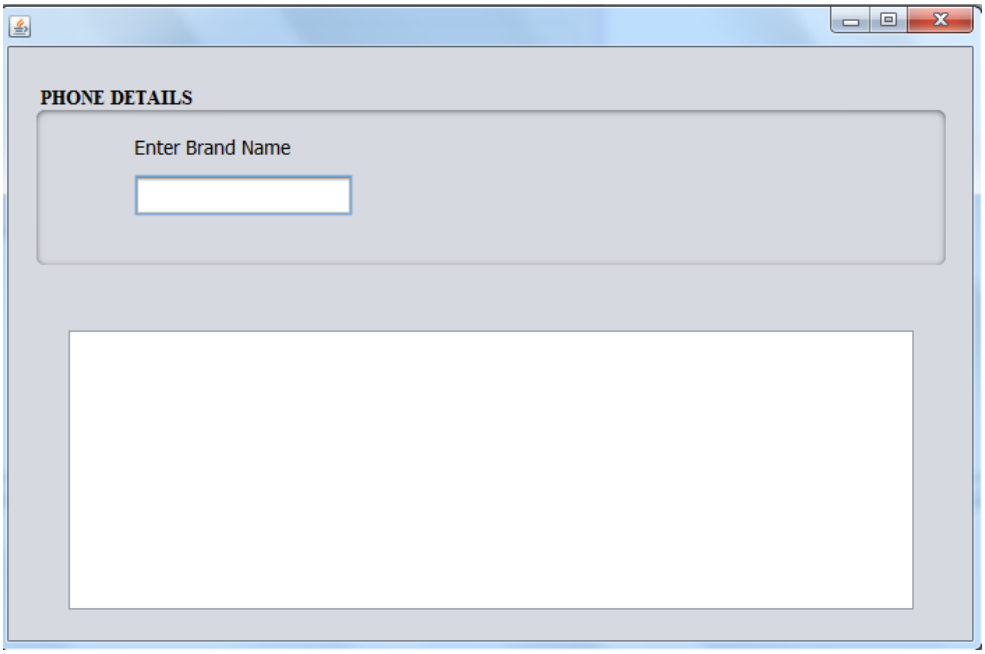
SECTION C

QUESTION 3:

KZN DIGITAL SERVICES manages the sales of a few major brands of mobile devices including cell phones and tablets. The company requires assistance to complete the software, designed to manage sales for each brand. This software is aimed at giving the auditors a quick glance of sales at the end of the year. They require a quick basic summary that is easy to read.

INSTRUCTIONS:

- Open the **DeviceFrame.java** file found in the **Q3Package** of the **Question3** java project.
- Insert your full name as a comment in the first line of the class. Compile and run it. You will notice that no functionality has been added.
- Carefully read through the description of what the company provides you with and help them solve their problems by completing the functionalities according to the requirements specified.
- The GUI provided and its respective components are a guide. You may add your own components to help solve the problems. Below is a screenshot of the given GUI:



DESCRIPTION:

The company has provided you with a **one dimensional array called arrSales** which has been inserted into the code. Each element of the array holds data that has been captured in the following format:

Brand Name#Category#Unit Price#Number Sold

e.g. arrSales[0] = Protech#S#4600#2

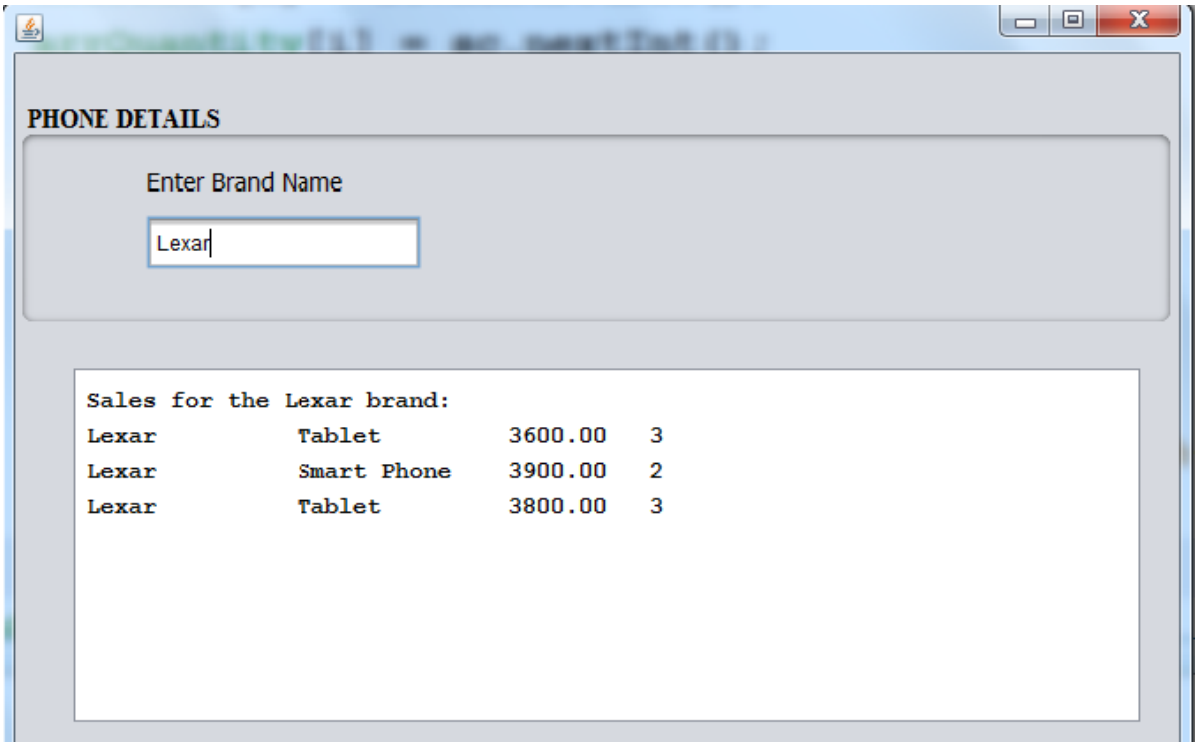
- **Protech** is the brand name.
- **S** refers to the category which represents the type of device sold.

  S: means that the device is a smart phone.
  T: means that the device is a tablet.

- **4600** is the cost price of a single unit
- **2** refers to the number of units sold

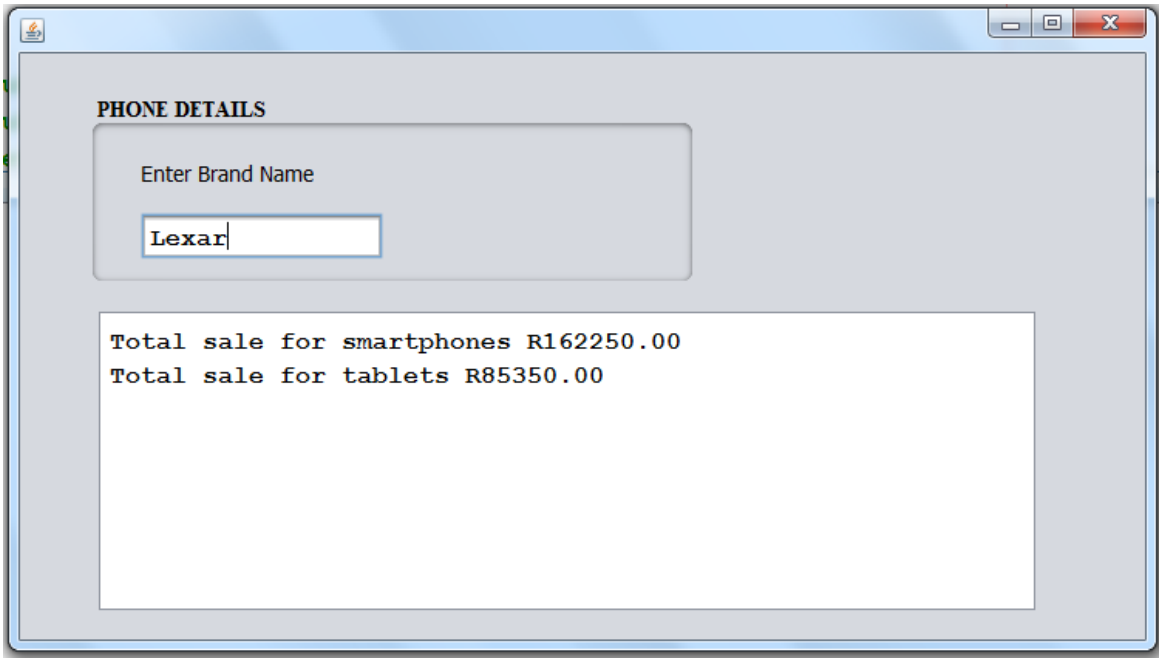
Note:
- You may create your own arrays and local/global variables as you see fit to solve the problems in order to meet the software needs of the company.
- You may add appropriate components to the given GUI to create a solution.

3.1 The brand name of a device is typed in by the user in the given text field. Write code to read the brand name from the text field. Find and output in the given text area the details of all sales of the specified device in neat columns with a suitable heading as indicated in the sample output below. (12)

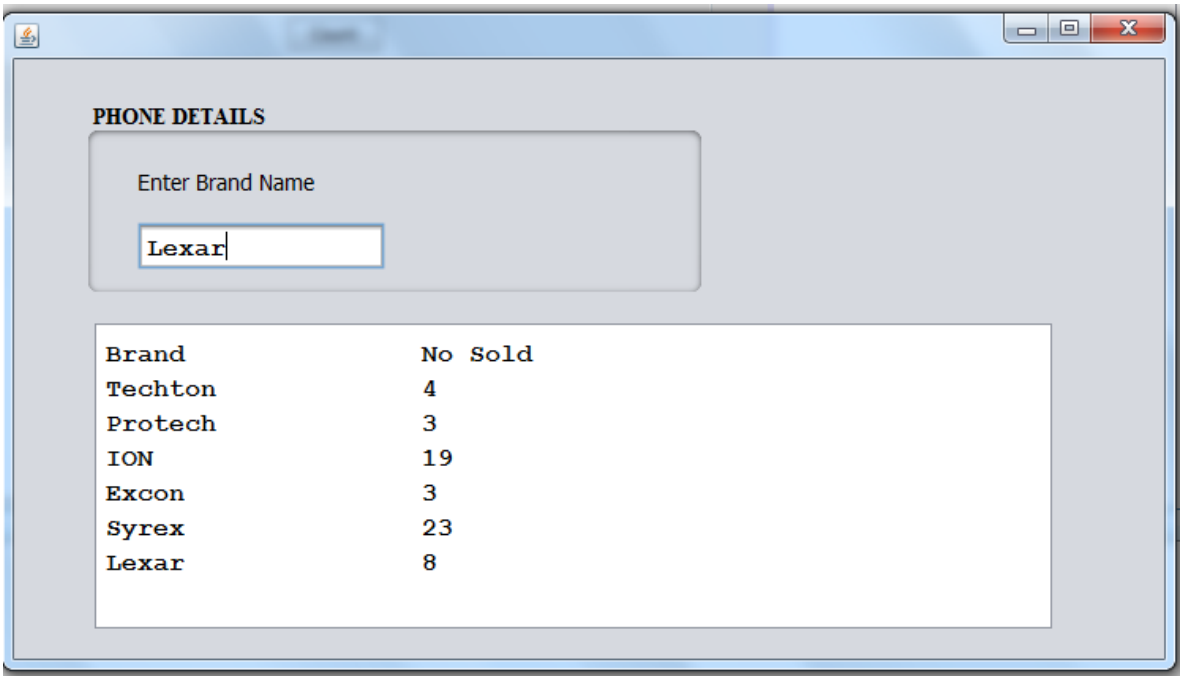


If the category is S then the word Smart Phone is displayed and if the category is T then the word tablet is displayed. The unit price must be formatted to 2 decimal places.

3.2 Determine the total amount earned from the sales of smart phones and the total amount earned from the sales of tablets. These amounts must be displayed in the given text area as indicated in the sample output. (12)



3.3 The manager requires the software to output the total number of devices that was sold for each brand. Write code to output the brand names and the total number of devices that was sold for each in table form with suitable headings. (NB the brand name cannot be repeated) This information must be displayed in the given text area as indicated in the sample output. (16)



SECTION TOTAL [40]

TOTAL [150]