Programming Fundamental Sep. 2022
55-403333
Coursework 1

Instructions

1. Coursework 1 is individual work and is marked at **100%.** This work contributes **40%** to your final marks.

2. You are tasked to write a console application using Python as detailed in the question. You may use your preference editor or Integrated Development Environment (IDE) to develop the application.

3. To complete this assignment, the following components of programming may be required: "*variables*, *loops*, *conditions*, *list of list, functions, recursion*". There is no need to use a library or functions in Python for this work.

4. You are **NOT ALLOWED** to add additional requirements or/and use advanced programming features. Failure to abide by this instruction will result to investigation or a Viva.

5. A video demonstration for the application example can be seen from here.

6. The deliverable submission should use the following naming convention,

    PFCoursework1_StudentID.zip

    example: PFCoursework1_232208.zip

7. Submission point is via Blackboard.

Assignment Deliverables

There are two (2) deliverables for the work,

1. A video showcasing the application (20 marks).
2. The application source-code (80 marks).

Key Date

Hand-in: 5 Jan 2023, Thursday, 3pm

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Question

This coursework is structured in **FOUR** sections:

- Main Menu Requirements (15 marks)
- Manage Mortgage Quotes Requirements (30 marks)
- Manage Mortgage Products Requirements (35 marks)
- Video Recording (20 marks)

Develop a console application using Python that enables the user to manage mortgage calculations and products. The application will have **THREE** (3) main menu items as below,

- Manage Loan Products
- Manage Quotes
- Quit

Each menu item has submenus which are outlined in the requirement section. There are **18 requirements** for the application. You are required to stick to the requirements as suggested in the interfaces.

Main Menu Requirements (15 marks):

Requirement 1: The application should start with a list of main menu items.

```
-----------------------------------------
:: Welcome to Mortgage Quotes System ::
-----------------------------------------
1. Manage Mortgage Products
2. Manage Quotes
3. Quit


Please select a menu option :
```

(*3 marks*)

Requirement 2: From requirement 1, prompt the user to input a number for the menu. If the user enters an invalid value, such as a **non-integer value, an alpha character or an integer greater than 3 and less than 1** then an appropriate message should be displayed, and the user should be asked to input a valid value.

```
----------------------------------------
:: Welcome to Mortgage Quotes System ::
----------------------------------------
1. Manage Mortgage Products
2. Manage Quotes
3. Quit

Please select a menu option : 9
Please enter a number between 1 and 3


----------------------------------------
:: Welcome to Mortgage Quotes System ::
----------------------------------------
1. Manage Mortgage Products
2. Manage Quotes
3. Quit

Please select a menu option : |
```

(*8 marks*)

Requirement 3: The application will go to the respective menu upon selection of the menu item.

```
----------------------------------------
:: Welcome to Mortgage Quotes System ::
----------------------------------------
1. Manage Mortgage Products
2. Manage Quotes
3. Quit

Please select a menu option : 1


----------------------------------------
:: Mortgage Products ::
----------------------------------------
1. View Products
2. Add Product
3. Amend Product
4. Delete Product
5. Return to Main Menu

Please select a menu option : |
```

(*3 marks*)

Requirement 4: The application will be exited upon selection of menu item 3.

```
----------------------------------------
:: Welcome to Mortgage Quotes System ::
----------------------------------------
1. Manage Mortgage Products
2. Manage Quotes
3. Quit

Please select a menu option : 3
You exited

Process finished with exit code 1
|
```

(*1 marks*)

Manage Mortgage Products Requirements (35 marks):

Requirement 5: Upon selection menu option 1 (*Manage Mortgage Products*) from the main menu, display the submenu items as follows,

- Add Products
- View Products
- Amend Products
- Delete Products
- Return to Main Menu

Allow the user to input an option for the menu item.

```
-------------------------------------
:: Mortgage Products ::
-------------------------------------
1. Add Product
2. View Products
3. Amend Product
4. Delete Product
5. Return to Main Menu


Please select a menu option :
```

(3 marks)

Requirement 6: Allow the user to create a mortgage product with the following fields upon selection menu *Add Products*,

- Product name
- Interest rate

Product records should be stored in a **list**. Create these products.

Product Name	Interest Rate
Home Loan Flexi	2.3
Santander Fresh Home Loan	1.8
Barclays First-Time Mortgage	1.98

The application should prompt the summary of the product before creation. Ask the user to input **1** to continue with the creation or press **any key** to quit from this process.

```
:: Creating a New Product ::
------------------------------------
Please input product name : Lloyds Homeloan
Please input the interest rate for this product : 2.1


===============================================
Product Summary
===============================================
Product name :  Lloyds Homeloan
Product rate :  2.1
-----------------------------------------------
Please confirm the product's details (input 1) to proceed with product creation (or any key to quit : )1

Creating New Product
Generating new product........
Generated product name :  Lloyds Homeloan
Generated product rate :  2.1
Press enter to continue
```

(8 marks)

Requirement 7: Upon selection of menu option 2 (*View Products*) from Manage Mortgage Products, display a list of products available in the application.

At the end of the list, prompt the user to press enter to continue and back to the main menu of Manage Mortgage Products.

```
================================================================================
List of Products
================================================================================
No. 1  :  Home Loan Flexi  |  Product rate :  2.3
No. 2  :  Santander Fresh Home Loan  |  Product rate :  1.8
No. 3  :  Barclays First-Time Mortgage  |  Product rate :  1.98
--------------------------------------------------------------------------------
Press enter to continue


--------------------------------------
:: Mortgage Products ::
--------------------------------------
1. View Products
2. Add Product
3. Amend Product
4. Delete Product
5. Return to Main Menu

Please select a menu option :
```

(5 marks)

Requirement 8: For amending a product (*Amend Products* menu), start with displaying a list of products to select from,

```
:: Amend a Product ::
------------------------------------


=================================================================================
List of Products
=================================================================================
No. 1  :   Home Loan Flexi  |  Product rate :   2.3
No. 2  :   Santander Fresh Home Loan  |  Product rate :   1.8
No. 3  :   Barclays First-Time Mortgage  |  Product rate :   1.98
---------------------------------------------------------------------------------
Select the product number to amend :
```

Upon selecting a valid product from the list, prompt the current values for the following fields before allowing the user to amend,

- Product name
- Product rate

The application should allow the user to escape from amending the fields if the user input *q* or *Q*.

The new values amended by the user will be updated in the record.

```
Product name :  Barclays First-Time Mortgage
New product name (press q/Q to escape) : q
Product rate :  1.98
New product rate (press q/Q to escape) : 2.3


===================================================
        Product Summary
===================================================
Product name :  Barclays First-Time Mortgage
Product rate :  2.3
---------------------------------------------------
Press enter to continue
```

Exception Handling:

If the input is invalid, prompt the user to input again.

```
================================================================================
List of Products
================================================================================
No. 1  :  Home Loan Flexi  |  Product rate :  2.3
No. 2  :  Santander Fresh Home Loan  |  Product rate :  1.8
No. 3  :  Barclays First-Time Mortgage  |  Product rate :  2.3
                                      --------------------------

Select the product number to amend : 4
Invalid input! Select the product number to amend : s
Invalid input! Select the product number to amend : |
```

(8 marks)

Requirement 9: The application will allow the user to delete products from the '*Delete Product*' menu. Display a list of products to select from for deletion. Allow the user to escape from this menu by inputting **q** or **Q**.

```
:: Delete a Product ::
---------------------------------


=================================================================================
List of Products
=================================================================================
No. 1  :   Home Loan Flexi   |   Product rate :   2.3
No. 2  :   Santander Fresh Home Loan   |   Product rate :   1.8
No. 3  :   Barclays First-Time Mortgage   |   Product rate :   1.98
---------------------------------------------------------------------------------
Select the product number to delete (enter q/Q to escape):
```

Prompt the user for the product to be deleted and ask the user to confirm (**c** or **C**) to proceed with deletion. The user can press enter to skip this process.

```
=================================================================================
List of Products
=================================================================================
No. 1  :   Home Loan Flexi   |   Product rate :   2.3
No. 2  :   Santander Fresh Home Loan   |   Product rate :   1.8
No. 3  :   Barclays First-Time Mortgage   |   Product rate :   1.98
---------------------------------------------------------------------------------
Select the product number to delete (enter q/Q to escape): 3
You are going to delete :
Product name :  Barclays First-Time Mortgage
Product rate :  1.98
Input c/C to confirm delete (or press enter to skip) : c
The record has been deleted!
Press enter to continue
```

Exception handling should be included in this requirement.

(8 marks)

11

Requirement 10: Upon selection menu 4 (*Return to Main Menu*), return to the main menu of the application.

(1 marks)

Manage Mortgage Quotes Requirements (30 marks):

Requirement 11: Display the following submenu items for '*Mortgage Quotes*',

- Create a quote
- View a list of quotes
- Amend a quote
- Return to Main Menu

Allow the user to input an option for the menu item.

```
----------------------------------------
:: Mortgage Quotes ::
----------------------------------------
1. Create a quote
2. View a list of quotes
3. Amend a quote
4. Return to Main Menu


Please select a menu option :
```

(*4 marks*)

Requirement 12: From requirement 11, prompt the user to input the menu again if the input is invalid (*Exception Handling*).

```
Please select a menu option : £%6f
You have entered a non-digit value
Please choose a number between 1 and 4


----------------------------------------
:: Mortgage Quotes ::
----------------------------------------
1. Create a quote
2. View a list of quotes
3. Amend a quote
4. Return to Main Menu


Please select a menu option :
```

(*4 marks*)

Requirement 13: Upon selection of menu option 1 (*Create a Quote*), prompt the following fields for a quote creation,

- Customer name
- Loan amount
- Term of loan in year - *(The loan term should be converted into months for calculations)*
- Product

Use the following default products for this requirement,

productData = [["Home Loan Flexi", 2.3],["Santander Fresh Home Loan", 1.8],["Barclays First-Time Mortgage",1.98]]

Calculate the monthly amount and total repayable using the following equations,

interestRate = float((interestRate)/100)/12

monthAmount = loanAmount * ((interestRate * ((1+interestRate) ** loanTerm)) / ((1+interestRate) ** loanTerm - 1))

totalRepayable = monthAmount*loanTerm

Save the record into a list variable.

```
=================================================
Create a Quote
=================================================
Please enter customer name : Rizwana
Please input loan amount : 210000
Please input term of loan in year : 23
List of products
-----------------------------------------
There are 3 products

1  :  Home Loan Flexi has interest rate 2.3
2  :  Santander Fresh Home Loan has interest rate 1.8
3  :  Barclays First-Time Mortgage has interest rate 1.98
Please select product number : 3
Your home loan product name        :  Barclays First-Time Mortgage
Your home loan rate                :  1.98
Your monthly repayment will be     : 947.841
Your total repayment will be       : 261604.07
Press enter to continue
```

(8 marks)

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Requirement 14:

Select option 2 to view a list of existing quotes. If there are no quotes than a message should be displayed to say that "*No quotes have been setup*".

The following screenshot shows what should be displayed if the default quote below is setup:

```
quoteData = [["Zairul",120000,15,"Home Loan Flexi",2.3,500,160000]]
```

```
================================================
List of Quotes
================================================
No.  1
Customer name       :  Zairul
Loan amount         :  120000
Loan term           :  15  months ( 1.2  years )
Loan product name   :  Home Loan Flexi
Loan product rate   :  2.3
Monthly repayment   :  500
Total repayment     :  160000
------------------------------------------------
Press enter to continue
```

Note: *The default quote is not valid data. You can amend it later in 'Amend a Quote'.*

Example of list of quotes with other quotes.

```
=================================================
List of Quotes
=================================================
No.  1
Customer name        :  Zairul
Loan amount          :  120000
Loan term            :  15  months ( 1.2  years )
Loan product name    :  Home Loan Flexi
Loan product rate    :  2.3
Monthly repayment    :  500
Total repayment      :  160000

No.  2
Customer name        :  Rizwana
Loan amount          :  123000.0
Loan term            :  240  months ( 20.0  years )
Loan product name    :  Santander Fresh Home Loan
Loan product rate    :  1.8
Monthly repayment    :  610.653
Total repayment      :  146556.778
-------------------------------------------------
Press enter to continue
```
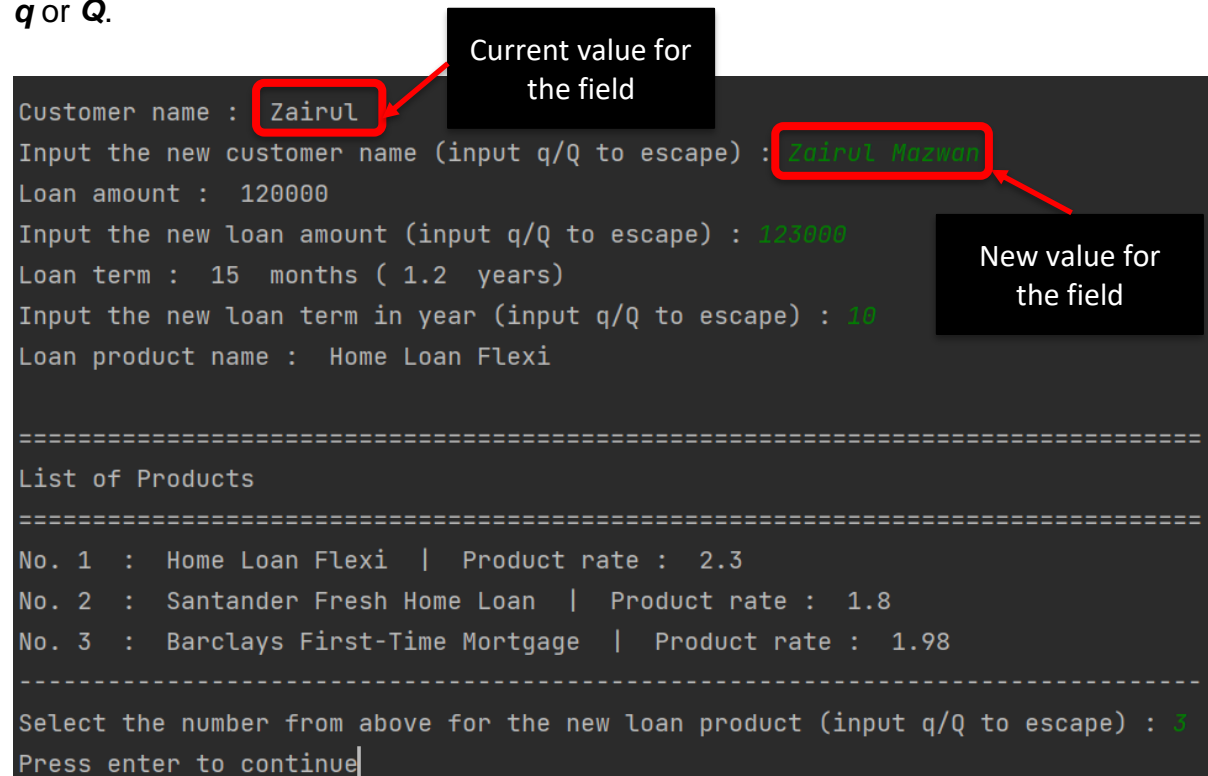
This record is an output from requirement 13 i.e Create a Quote

(*4 marks*)

Requirement 15: From requirement 14, at the end of the list, prompt the user to press enter to continue, and return to the Manage Quotes menu.

```
=================================================
List of Quotes
=================================================
No.  1
Customer name       :  Zairul
Loan amount         :  120000
Loan term           :  15  months ( 1.2  years )
Loan product name   :  Home Loan Flexi
Loan product rate   :  2.3
Monthly repayment   :  500
Total repayment     :  160000
-------------------------------------------------
Press enter to continue


-----------------------------------------
:: Mortgage Quotes ::
-----------------------------------------
1. View a list of quotes
2. Amend a quote
3. Create a quote
4. Return to Main Menu

Please select a menu option : |
```

(*1 marks*)

Requirement 16: Upon selection of menu option 3 (*Amend a quote*), display a list of quotes for the user to select from. You may reuse/call the code you wrote in requirement 14.

Ask the user to select the number for a quote to amend. If the user wishes to quit from amending quotes, guide the user input *q* or *Q* to exit from this menu and back to the Manage Quotes menu.

```
==================================================
List of Quotes
==================================================
No.  1
Customer name        :  Zairul
Loan amount          :  120000
Loan term            :  15  months ( 1.2  years )
Loan product name    :  Home Loan Flexi
Loan product rate    :  2.3
Monthly repayment    :  500
Total repayment      :  160000
--------------------------------------------------
Press enter to continue
Select the quote number to amend (enter q/Q to escape) : |
```

(*3 marks*)

Requirement 17: Upon selection the quote number, allow the user to update each field for the quote. The current value for the fields should be displayed before the user inputs the new value.

The application should allow the user to escape from amending the fields if the user input *q* or *Q*.

```
Customer name :  Zairul
Input the new customer name (input q/Q to escape) : Zairul Mazwan
Loan amount :  120000
Input the new loan amount (input q/Q to escape) : 123000
Loan term :  15  months ( 1.2  years)
Input the new loan term in year (input q/Q to escape) : 10
Loan product name :  Home Loan Flexi


=================================================================
List of Products
=================================================================
No. 1  :  Home Loan Flexi  |  Product rate :  2.3
No. 2  :  Santander Fresh Home Loan  |  Product rate :  1.8
No. 3  :  Barclays First-Time Mortgage  |  Product rate :  1.98
-----------------------------------------------------------------
Select the number from above for the new loan product (input q/Q to escape) : 3
Press enter to continue
```

Current value for the field

New value for the field

(*5 marks*)

Requirement 18: Upon selection of menu option 4 (*Return to Main Menu*), return to the main menu of the application.

(1 marks)

Video Recording (20 marks)

A video recording (**not more than 7 minutes**) showcasing a workable application (**with voice in the video**) should be submitted for the work. The content of the video should be,

- Workable application demonstrating all requirements.
- A brief explanation of the program code at the end of the video.
- If the program has errors that prevent the flow of demonstration, explain the source code in the video recording.

You are **strongly advised** to use **Panopto** which is accessible from the Blackboard page.
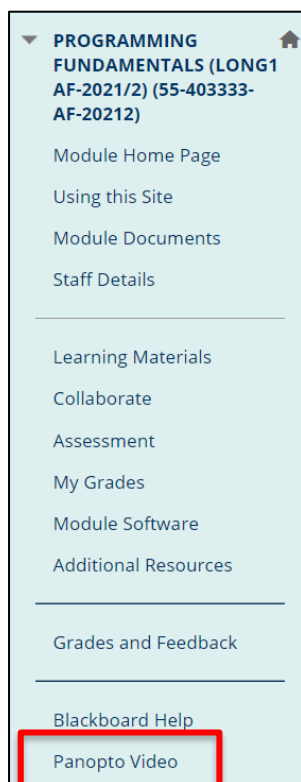
If you publish your video recording on YouTube, please make it public and share the link to the submission point.

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You are advised to contact Babak (b.khazaei@shu.ac.uk),
Zairul (zm1142@hallam.shu.ac.uk) and Rizwana Rashad (rr7754@exchange.shu.ac.uk)
for any queries about the work.

Appendix

How Do I Calculate Mortgage Repayments? - OnLadder

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How Marks Are Awarded

Requirement	Marks			
	0	**1**	**2**	**3**
Req 1	This requirement is not delivered in the work	Attempt to deliver this requirement with errors	Two menu items are delivered/displayed in the application.	Three menu items are delivered/displayed in the application.
	0	**1-2**	**3-7**	**8**
Req 2	This requirement is not delivered in the work	Attempt to deliver this requirement with errors	Minor errors (logical) for the requirements. Some features are not working perfectly.	All requirements are captured for this task.
	0	**1**	**2**	**3**
Req 3	This requirement is not delivered in the work.	Attempt to deliver this requirement with errors.	Minor errors (logical) for the requirement.	Chosen menu by the user is displayed.
	0			**1**
Req 4	This requirement is not delivered in the work or errors.			The application will be exited upon selection of menu item 3.
	0	**1**	**2**	**3**
Req 5	This requirement is not delivered in the work	Attempt to deliver this requirement with errors	Not all menu items are listed or an input allowed for the user.	Manage Mortgage Products menu items are listed to the user and allow them to input the menu option.

	0	1-4	5-7	8
Req 6	This requirement is not delivered in the work	Attempt to deliver this requirement with errors	Some fields/requirements are missing for this task.	All fields for products are captured including exception handling.
	0	1-2	3-4	5
Req 7	This requirement is not delivered in the work	Attempt to deliver this requirement with errors	Some requirements are missing.	The view product requirements are perfectly delivered.
	0	1-4	5-7	8
Req 8	This requirement is not delivered in the work	Attempt to deliver this requirement with errors	Minor logical errors for the requirement/some requirements are missing.	All requirements for amend products are delivered including exception handling.
	0	1-4	5-7	8
Req 9	This requirement is not delivered in the work	Attempt to deliver this requirement with errors	Minor logical errors for the requirement/some requirements are missing.	All requirements for delete products are delivered including exception handling.
	0			1
Req 10	This requirement is not delivered in the work			Return to the main menu of the application from delete products is delivered.

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Requirement	Marks			
	0	**1**	**2-3**	**4**
Req 11	This requirement is not delivered in the work	Attempt to deliver this requirement with errors	Not all menu items are listed or an input allowed for the user.	Mortgage Quotes menu items are listed to the user and allow them to input the menu option.
	0	**1**	**2-3**	**4**
Req 12	This requirement is not delivered in the work	Attempt to deliver this requirement with errors	Exception handling does not work for all types of input.	Exception handling for requirement 11 work perfectly.
	0	**1-4**	**5-7**	**8**
Req 13	This requirement is not delivered in the work	Attempt to deliver this requirement with error.	Some requirements are missing or logical errors.	All "create a quote" requirements are captured and works perfectly.
	0	**1-2**	**3**	**4**
Req 14	This requirement is not delivered in the work	Attempt to deliver the requirement with syntax errors.	Some requirements are missing or logical errors.	View a list of existing quotes requirements are captured and works perfectly.
	0			**1**
Req 15	This requirement is not delivered in the work or errors.			The user is able to press enter to continue, and return to the Manage Quotes menu.

Requirement	Marks			
	0	**1**	**2**	**3**
Req 16	This requirement is not delivered in the work	Attempt to deliver the requirement with syntax errors.	Some requirements are missing or logical errors.	All "amend a quote" requirements are captured including reuse list of quotes in this task.
Req 17	**0**	**1**	**3-4**	**5**
	This requirement is not delivered in the work	Attempt to deliver the requirement with syntax errors.	Some requirements are missing or logical errors.	Allow the user to update each field for the quote. The current value for the fields should be displayed before the user inputs the new value. This task works perfectly including escape from amending.
	0			**1**
Req 18	This requirement is not delivered in the work or errors.			The user is able to return to the main menu
	0	**1-10**	**11-17**	**18-20**
Video Recording	No video recording submitted	Some requirements are presented in the video.	The video covers all requirements clearly	The video recording is excellent (comprehensive) demonstrating the work and code quality