Department of Computer Engineering
Faculty of Engineering
University of Sri Jayewardenepura

Course	Programming Quest
Course Code	CO2210
Deadline	2355H on 25th Oct 2021
Assignment No.	5
Total Marks	100
Outcomes	The objectives of this lab session are, ● Use good coding practices. ● Developing a user interactive GUI in console mode ● Getting familiar with real world application of programming ● Using algorithms suits with the application ● Getting familiar with file operations

General Instructions

- No food, drinks, backpacks, and bags are allowed to take inside the laboratory.
- Login to the computer using the 'Student' account.
- Create a folder in the D drive to save your work and name it according to the following format: *yy_ENG_xxx* (e.g. 16_ENG_135).
- Use the following format when you naming the source files: *yy_ENG_xxx_L_n.cpp*, *yy_ENG_xxx* is your registration number, *L* stand for the lab number, and *n* represent the exercise number (e.g. 16_ENG_135_1_1.cpp).
- Please save your work frequently during the practical session to avoid data lose due to unavoidable circumstances.
- Your files will be erased after the practical session. Therefore, please keep a backup to yourself.
- This is a individual assignment.

Build a console C++ application to calculate bank loan monthly payment

Background of loan calculation

Banks are offering different kind of loan schemes such as home loan, vehicle loan, personal loan, and etc. The monthly payment changes with the scheme's period, interest rate, and the loan amount. Once those three factors are fixed, the monthly payment is calculated which is a combination of monthly interest and loan deduction. In general, the interest rate can be either fixed or varied during the loan period.

Monthly payment can be calculated as follows:
Number of periodic payments **(n)** - number of years times number of months per year.
Periodic interest rate **(IR)** - this can be calculated by dividing the annual interest rate by number of months per year.
Discount factor **(D)** = { [(1+IR)^n] - 1 } / [IR × (1 + IR)^n]
Total monthly payment = Loan Amount / Discount Factor

Example:
Assume a LKR1,000,00.00 loan with fixed 12% annual interest rate is given for a period of 5 years. Then,
n = 12 × 5 = **60**
IR = 0.12 / 12 = **0.01**
D = { [(1+0.01)^60] - 1 } / [0.01 × (1 + 0.01)^60] = **44.95**
Total monthly payment = 1,000,000/44.95 = **LKR 22,244.45** (this is fixed)
The customer has to pay LKR 22,244.45 each month. This includes monthly interest on remaining loan and loan deduction, which can be calculated for each month as follows.

Loan remains for first month = LKR1,000,000.00.
First month interest = LKR1,000,000×(12%/12) = LKR 10,000.00
Loan repaid in the first month = LKR 22,244.45 - 10,000 = LKR 12,244.45

Loan remains for second month = LKR (1,000,000 - 12,244.45)
Second month interest = LKR (1,000,000 - 12,244.45)×(12% / 12)
= LKR 9,877.55
Loan repaid in the second month= LKR 22,244.45 - 9,877.55 = LKR 12,366.89

Table 1 : Monthly repay calculation (currency in LKR)

Month	Remaining Loan Amount	Interest	Repaid loan amount
1	1,000,000.00	10,000.00	12,244.45
2	987,755.55	9,877.55	12,366.89
3	975,388.55	9,753.88	12,490.56
4	...	...	...

Currency values are rounded to nearest 2nd decimal place.

An urban bank is offering loans with following features summarized in Table 2.

Table 2 : Loan details (currency in LKR)

Loan Name	Customer's Age (yrs)	Monthly income	Max. Loan Amount	Max. Repay period (in months)	Annual interest rate (%) FIXED
Vehicle	Between 18 to 55 years	Above 45,000	1,000,000.00	60	14
Housing	Between 25 to 55 years	Above 100,000	2,500,000.00	60	8
Education	Between 25 to 35 years	Above 45,000	1,500,000.00	284	6
Senior Citizen	Above 60	Above 35,000	500,000.00	60	4.5
Personal	Between 30 to 55 years	Above 100,000	2,000,000.00	60	14.5
			3,000,000.00	84	16.2

**Note:*

In age indication, 'between x and y' means that the range includes x and y.

In monthly income, 'Above x' means that x is the lowest value.

Build a console C++ application for following guidelines.

- The application first request the banker to enter customer's details: Name, age, and monthly income.
- The name, maximum loan amount, maximum repay period allowed, and interest rate of each loan that the customer can apply should be displayed and asked to select one of them to proceed.
- Once a loan is selected, enter the amount of money that customer wishes to barrow and possible repay period. These values should not exceed the maximum values indicated in the above table.
- Then, display the monthly repay amount, total amount of money that customer pays and total amount of interest earned by the bank at the end of the loan period.
- Before go the next calculation or customer, print following details to a text file:
  - I. Name of the customer
  - II. Selected Loan
  - III. Maximum repay period allowed
  - IV. Annual Interest Rate
  - V. Requested loan amount and repay period.
  - VI. Table 1 with column headers
  - VII. Total amount of money paid by the customer at the end of the loan repay period.
  - VIII. The file should be saved with the customer's name (eg. If Mr. ABC Perera apply for a loan, then the text file should be saved as Mr_ABC_Perera.txt)