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| **Programming 2**  Diploma in IT / DS / CSF  Year 1 (2021/22) Semester 2 | Week **4** |
| **2 hours** |
| **Practical 4 : Inheritance** | |

**Objectives**

At the end of this practical, the students should be able to:

* write their own classes and subclasses
* use their own classes

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| **IMPORTANT**   * Create a folder, **week04.** * Create a new Console App (.NET Core) project, **Snnnnnnnn\_MyBankApp**, in the **Week04** folder created above *(note:* ***Snnnnnnnn*** *is your Student Number)*. * At the end of the session, copy the folder **Week04** folder (which contains all your work) to PRG2 network folder: **\\ictspace.ict.np.edu.sg\PRG2**. |

The ***savings account*** is a type of bank account that earns interest based on some prevailing interest rate. Assuming the **BankAccount** class and the **SavingsAccount** class are defined as shown below.

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| **BankAccount** |
| -accNo:string  -accName:string  -balance:double |
| +BankAccount()  +BankAccount(string,string,double)  +Deposit(double)  +Withdraw(double):bool  +ToString():string |

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| **SavingsAccount** |
| -rate:double |
| +SavingsAccount()  +SavingsAccount(string,string,double,double)  +CalculateInterest():double  +ToString():string |

1. Implement the **BankAccount** class.

Note:

* **Deposit(double)** deposits a given amount to the bank account. No value is returned.
* **Withdraw(double)** withdraws a given amount from the bank account if there is sufficient balance. The method returns true if withdrawal is successful, false otherwise.
* **ToString()** returns the attribute values with description as a string.

1. Implement the **SavingsAccount** class as subclass of **BankAccount**.

Note:

* **rate** records the interest rate in percentage.
* **CalculateInterest()** calculates and returns the interest based on the account balance and interest rate using the formula

Balance \* Interest rate / 100.

* **ToString()** returns the attribute values with description as a string. You should reuse the method defined in the superclass.

1. In the **Program.cs**, do the following:
2. Read the **savings\_account.csv** file to create **SavingsAccount** objects and store the objects in the List called **savingsAccList**.

Note: you should do this task in a method. Main() method will call this method to initialize data in the list.

1. Write a DisplayMenu() method to display the following menu:

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| Menu  [1] Display all accounts  [2] Deposit  [3] Withdraw  [0] Exit  Enter option: |

1. In the **Main()** method call the DisplayMenu() method to display the menu and perform task according to the selected option until user chooses to exit.

Option 1: Display all records

* Write a method to display all **SavingsAccount** objects stored in **savingsAccList**. The method header should be

static void DisplayAll(List<SavingsAccount> sList)

* Call the method when option 1 is selected.

Sample output (value underlined is the user input):

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| Menu  [1] Display all accounts  [2] Deposit  [3] Withdraw  [0] Exit  Enter option: **1**  Acc No:111-01 Acc Name:Bob Balance:2000 Rate:2  Acc No:111-02 Acc Name:Mary Balance: 000 Rate:2  Acc No:111-03 Acc Name:Tom Balance:1000 Rate:1.5 |

Option 2: Deposit

* Write a method to search for the savings account with the following method header:

static SavingsAccount Search(List<SavingsAccount> sList, string accNo)

The method returns the **SavingsAccount** object if found, or null if not found.

* Prompt the user to input the savings account number thatthe amount is to be deposited to.
* Call the Search() method to search for the account.
* Prompt the user for the amount to be deposited, and call Deposit() method on the **SavingsAccount** object.
* Display the details of the object.

Sample output (values underlined are user input):

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| Menu  [1] Display all accounts  [2] Deposit  [3] Withdraw  [0] Exit  Enter option: **2**  Enter the Account Number: 111-01  Amount to deposit: 300  $300 deposited successfully  Acc No:111-01 Acc Name:Bob Balance:2300 Rate:2  Menu  [1] Display all accounts  [2] Deposit  [3] Withdraw  [0] Exit  Enter option: **2**  Enter the Account Number: 111-05  Unable to find account number. Please try again. |

Option 3: Withdraw

* Prompt the user to input the savings account number that the amount is to withdrawn from.
* Call the Search() method to search for the account.
* Prompt user for the amount to be withdrawn.
* Call Withdraw() method on the **SavingsAccount** object.
* If there are insufficient funds, the program should display an alert.
* Display the details of the object if withdrawal is successful.

Sample output (values underlined are user input):

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| Menu  [1] Display all accounts  [2] Deposit  [3] Withdraw  [0] Exit  Enter option: **3**  Enter the Account Number: 111-03  Amount to withdraw: 2000  Insufficient funds.  Menu  [1] Display all accounts  [2] Deposit  [3] Withdraw  [0] Exit  Enter option: **3**  Enter the Account Number: 111-03  Amount to withdraw: 500  $500 withdrawn successfully  Acc No:111-03 Acc Name:Tom Balance:500 Rate:1.5  Menu  [1] Display all accounts  [2] Deposit  [3] Withdraw  [0] Exit  Enter option: **3**  Enter the Account Number: 111-05  Unable to find account number. Please try again.  Menu  [1] Display all accounts  [2] Deposit  [3] Withdraw  [0] Exit  Enter option: **0**  ---------  Goodbye!  --------- |

**Additional Features**

1. Add an option 4 to display details of all accounts together with the interest.

Sample output (values underlined are user input)

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| Menu  [1] Display all accounts  [2] Deposit  [3] Withdraw  [4] Display details  [0] Exit  Enter option: **4**  Acc No Acc Name Balance Rate Interest  111-01 Bob 2000.00 2.00 40.00  111-02 Mary 5000.00 2.00 100.00  111-03 Tom 1000.00 1.50 15.00 |

**Plagiarism Warning:**

**If a student is found to have submitted work not done by him/her, he/she will not be awarded any marks for this practical. Disciplinary action may also be taken.**

**Similar action will be taken for student who allows other student(s) to copy his/her work.**