PROG10082 Object Oriented Programming 1 – JAVA

Assignment 1

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Problem (Future Value of Investment)
Future value of an investment refers to how much an investment today would grow to over a period if put in an investment plan that pays compound interest. The formula for calculating future value is:

$$FV = PV (1 + r/m) ^ {mt}$$

Where
FV ---- is the future value
PV ---- is the present value, the money invested today
r ------ is the annual interest rate
t ------ is the number of years (i.e., duration of investment plan)
m ---- is the number of times the money invested in the plan

Solution:

Solution

1. ## Analysis

Inputs: inputs are Amount of money for investment, Annual interest rate, The duration of investment in years, The number of times the money invested in the plan. All of them are double values. None of them can be negative. And The number of times the money invested cannot be zero as well because it will be used in division in the formula.
Output: The output is the result of the calculation of the formula for the investment.

The input asked from the user all in double. I also checked if the input entered in negative. I put the checking in "while" because I want to check until user input a value greater than or equal to zero. Note that for number of investment time per year, I checked it to be greater than zero. It cannot be zero as well.
For the calculation I used pow in java.
At the end I print the result.

2. ## Algorithm
A) Get the amount of the present value as double from user. Get the annual interest as double from user. Get the duration of investment plan as double from user. Get the number of times the money invested in the plan as double from user.
B) All the values should be check not to be negative and for the number of times the money invested in the plan can not be zero because of division. For every negative input, I ask the alert the user and ask for entering a new one.
C) computing the Future value of an investment by putting the values that we get from user in Future value formula futureValue = presentValue * (double)Math.pow(1 + annualRate / moneyInvestedTimes , moneyInvestedTimes * timeDuration);
D) Output the result of Future value.

3. Source code

```java
package assignment;
import java.util.Scanner;

/*
 * Assignment 2 (Future Value of Investment)
 * instructor: Muhammad Shafique
 * Author: Amir Hosein Khanmohammadi
 * student number: 991646689
 * Date: October 7 , 2022
 * This application Computing the Future value of an investment,
 * which refers to how much an investment today would grow over
 * a period if put in an investment plan that pays compound interest.
 */


public class Assignment02futureValue {

    public static void main(String[] args) {

        double futureValue; // is the future value
        double presentValue; // is the present value, the money invested
today
        double annualRate; // is the annual interest rate
        double timeDuration; // is the number of years (i.e., duration of
investment plan)
        double moneyInvestedTimes; // is the number of times the money
invested in the plan


        Scanner sc = new Scanner(System.in);

        System.out.print("Please enter the amount of the present value,
the money that you invested today: ");
        presentValue = sc.nextDouble();
        //checking if user entered a negative number
        while (presentValue<0) {
            System.out.println("Amount of money cannot be negetive.");
            System.out.print("Please enter the amount of the present
value, the money that you invested today: ");
            presentValue = sc.nextDouble();

        }

        System.out.print("Please enter the annual interest rate: ");
        annualRate = sc.nextDouble();
        //checking if user entered a negative number
        while (annualRate <0) {
            System.out.println("Annuaml interest rate cannot be
negetive.");
            System.out.print("Please enter the annual interest rate:
");
            annualRate = sc.nextDouble();
```

```java
			}

			System.out.print("Please enter the duration of investment plan (years): ");
			timeDuration = sc.nextDouble();
			//checking if user entered a negative number
			while (timeDuration <0) {
				System.out.println("Investemt duration cannot be negetive.");
				System.out.print("Please enter the duration of investment plan (years): ");
				timeDuration = sc.nextDouble();


			}



			System.out.print("Please enter the number of times the money invested in the plan: ");
			moneyInvestedTimes = sc.nextDouble();
			//checking if user entered a negative number or zero
			while (moneyInvestedTimes <=0) {

				System.out.println("Number of times should be greater than 0.");
				System.out.print("Please enter the number of times the money invested in the plan: ");
				moneyInvestedTimes = sc.nextDouble();


			}


			futureValue = presentValue *  (double) Math.pow( 1 + annualRate / moneyInvestedTimes , moneyInvestedTimes * timeDuration );

			System.out.println("Your Future value of an investment is: " + futureValue);



	}

}
```

Sample run for test case 1

Please enter the amount of the present value, the money that you invested
today: 5000
Please enter the annual interest rate: 0.05
Please enter the duration of investment plan (years): 8
Please enter the number of times the money invested in the plan: 1
Your Future value of an investment is: 7387.277218945315

```
Please enter the amount of the present value, the money that you invested today: 5000
Please enter the annual interest rate: 0.05
Please enter the duration of investment plan (years): 8
Please enter the number of times the money invested in the plan: 1
Your Future value of an investment is: 7387.277218945315
```

Sample run for test case 1

Please enter the amount of the present value, the money that you invested
today: 2000
Please enter the annual interest rate: 0.23
Please enter the duration of investment plan (years): 10
Please enter the number of times the money invested in the plan: 2
Your Future value of an investment is: 17641.16830453963

```
Please enter the amount of the present value, the money that you invested today: 2000
Please enter the annual interest rate: 0.23
Please enter the duration of investment plan (years): 10
Please enter the number of times the money invested in the plan: 2
Your Future value of an investment is: 17641.16830453963
```