**TOP DOWN DESIGN**

**IPO CHART**

|  |  |  |
| --- | --- | --- |
| **Input** | **Process** | **Output** |
| dStartingBalance | MonthlyInterests[iMonthCounter] = ((dInterestRate / 12) \* (dBeginMonthBalance + dEndMonthBalance) / 2); | dStartingBalance |
| dInterestRate |  | dDepositSum |
| dDeposit |  | dWithdrawalSum |
| dWithdrawal |  | dCurrentBalance |
|  |  | dTotalInterest |
|  |  | Parking |
|  |  | TotalDeductions |
|  |  | NetPay |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |

**VARIABLES**

bool flag = true;

string line;

double dDigit = 0;

double dStartingBalance;

double dCurrentBalance;

double dInterestRate;

double dDeposit;

double dWithdrawal = 0.0;

double dTotalInterest = 0.0;

double dDepositSum = 0.0;

double dWithdrawalSum = 0.0

double MonthlyInterests[3];

**FORMULAS**

MonthlyInterests[iMonthCounter] = ((dInterestRate / 12) \* (dBeginMonthBalance + dEndMonthBalance) / 2);

**HIERARCHY**

**PSEUDOCODE**

main module

Declare boolean flag = true

Declare double dStartingBalance;

Declare double dCurrentBalance;

Declare double dInterestRate;

Declare double dDeposit;

Declare double dWithdrawal = 0.0;

Declare double dTotalInterest = 0.0;

Declare double dDepositSum = 0.0;

Declare double dWithdrawalSum = 0.0;

Declare double MonthlyInterests[3];

Write "Please enter your starting balance:"

Input dStartingBalance

Write “Please enter the annual interest rate as a percentage”

Input dInterestRate

dInterestRate = dInterestRate / 100

for (int iMonthCounter = 0; iMonthCounter <= 2; iMonthCounter++)

{

dBeginMonthBalance = dCurrentBalance

Write "Enter the total amount for the deposits in month " + iMonthCounter + 1 +":"

Input dDeposit

dCurrentBalance += dDeposit  
dDepositSum += dDeposit

while (flag) {  
 Write "Enter the total amount withdrawn from the account during month " + iMonthCounter + 1 + ":"

Input dWithdrawal

if (dWithdrawal > dCurrentBalance) {  
 flag = true;  
 Write "You can't withdraw more than you have in your account."   
 Write "Your current balance is: $" + dCurrentBalance   
 } else {  
 flag = false;  
 }  
  
}

dCurrentBalance -= dWithdrawal;  
dWithdrawalSum += dWithdrawal;

Declare double dEndMonthBalance = dCurrentBalance

MonthlyInterests[iMonthCounter] = ((dInterestRate / 12) \* (dBeginMonthBalance + dEndMonthBalance) / 2)

dCurrentBalance += MonthlyInterests[iMonthCounter

foreach (double MonthlyInterest as MonthlyInterests) {  
  
 dTotalInterest += MonthlyInterest;  
}

Write "Staring balance:\t\t$" + dStartingBalance   
Write "Total deposits:\t\t\t$" + dDepositSum

Write "Total withdrawals:\t\t$" + dWithdrawalSum  
Write "Total interest earned:\t$" + dTotalInterest   
Write "Final balance:\t\t\t$" + dCurrentBalance

**}**

**TEST DATA – 5 complete data sets**

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Input** | **Process** | **Output** |
| **dStartingBalance** | 0 | 0 | Staring balance: $0.00 |
| **dInterestRate** | 0 | Total deposits: $0.00 |
| **dDeposit** | 0,0,0 | Total withdrawals: $0.00 |
| **dWithdrawal** | 0,0,0 | Total interest earned: $0.00 |
| Final balance: $0.00 |
|  |
|  |  |  |
|  |  |  |  |
|  |  |  |  |
| **dStartingBalance** | 100 | 100  10 / 100 = .10  (.10 / 12) \* ((100 +100)/2) = .8333…  .8333… \* 3 = 2.52  100+2.52 = 102.52 | Staring balance: $100.00 |
| **dInterestRate** | 10 | Total deposits: $0.00 |
| **dDeposit** | 0,0,0 | Total withdrawals: $0.00 |
| **dWithdrawal** | 0,0,0 | Total interest earned: $2.52 |
|  |  | Final balance: $102.52 |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |
| **dStartingBalance** | 200 | 200  50/100 = .50  (.5 / 12) \* ((200 +200)/2) = 8.333 …  (.5 / 12) \* ((200 +210)/2) = 8.541  (.5 / 12) \* ((210 +210)/2) = 8.75  8.33 + 8.541 + 8.75 = 26.69 | Staring balance: $200.00 |
| **dInterestRate** | 50 | Total deposits: $20.00 |
| **dDeposit** | 10,10,0 | Total withdrawals: $10.00 |
| **dWithdrawal** | 10,0,0 | Total interest earned: $26.69 |
|  |  | Final balance: $236.69 |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |  |
| **dStartingBalance** | 99 | various mathematics, but you see how it should work. Final balance should be 0 | Staring balance: $99.00 |
| **dInterestRate** | 0 | Total deposits: $0.00 |
| **dDeposit** | 0,0,0 | Total withdrawals: $99.00 |
| **dWithdrawal** | 33,33,33 | Total interest earned: $0.00 |
|  |  | Final balance: $0.00 |
|  |  |  |
|  |  |  |
|  |  |  |
|  |  |  |  |
| **dStartingBalance** | 10 | 10 | Staring balance: $10.00 |
| **dInterestRate** | 0 | Total deposits: $0.00 |
| **dDeposit** | 0,0,0 | Total withdrawals: $0.00 |
| **dWithdrawal** | 0,0,0 | Total interest earned: $0.00 |
|  |  | Final balance: $10.00 |
|  |  |  |
|  |  |  |
|  |  |  |