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//      Course: CS2400-60 Computer Science 2
//      Name: Abdalkarim, Marina
//      Assignment: Programming Assignment P8.1
//      Date assigned: 11/19/18
//      Date due: 11/27/18
//      Date handed in: 11/27/18
//      Remark: The program tests all functions.
#include <iostream>
#include <string>
#include <iomanip>
#include <cassert>
using namespace std;
class savingsAcct
{
    friend istream& operator>>(istream&, savingsAcct&);
    // Postcondition: the integer values entered by the user are assigned to the data
    // members
    friend ostream& operator<<(ostream&, const savingsAcct&);
    // Postcondition: displays the contents of the class passed to the function
public:
    savingsAcct();
    // Postcondition: balance is set to 0
    savingsAcct(string acctNum, double amt);
    // Postcondition: balance is set to the value passed to parameter amt
    static double * getAddressOfVar_annulRate();
    // Postcondition: return the address of static variable annualRate (should the same for all
    // objects!)
    static double getAnnualRate();
    // Postcondition: returns annual interest rate
    static void setAnnualRate(double rate);    // change the annual interest rate
    // Postcondition: annualRate has been changed to the value passed to parameter rate
    void computeIntrest();
    // Interest is computed at the end of each month using monthly interest rate
    // (i.e., annualRate/12)
    // Postcondition: interest is computed at the end of the month using the current balance
private:
    string acctNo;           // e.g., A1234
    double balance;
    static double annualRate; // classwide; store in a memory location shared by objects

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        double interest;                // monthly interest
};
double savingsAcct::annualRate;
int main()
{
    cout << "As of now, no object has been declared.\n";
    cout << "However, static data members exist before any object is declared:" << endl;
    cout << "  The address of its storage location: "
        << int(savingsAcct::getAddressOfVar_annulRate()) << endl;
    cout << "          Annual interest rate: " << savingsAcct::getAnnualRate() * 100
        << "%" << endl << endl;
    cout << "Still no object has declared, we now set the interest rate to 1.5%." << endl;
    savingsAcct::setAnnualRate(0.015);
    cout << "  Now, the annual interest rate is: " << savingsAcct::getAnnualRate() * 100
        << "%" << endl << endl;
    cout << "We now declare and initialize 2 savingAcct objects." << endl;
    cout << "We also compute interest at the end of 1st month and display their
    contents:\n\n";
    savingsAcct s1("A1234", 5000), s2("A9876", 8000);
    s1.computeIntrest();
    s2.computeIntrest();
    cout << s1 << endl << endl;
    cout << s2 << endl << endl;
    cout << "We now display the address of static variable annualRate" << endl;
    cout << "  by calling \"getAddressOfVar_annulRate()\" member function" << endl <<
    endl;
    cout << "Via s1: the address of \"annualRate\" is " <<
    int(s1.getAddressOfVar_annulRate())
        << endl;
    cout << "Via s2: the address of \"annualRate\" is " <<
    int(s2.getAddressOfVar_annulRate())
        << endl;
    cout << "Via s1: the address of \"annualRate\" is "
        << int(savingsAcct::getAddressOfVar_annulRate()) << endl;
    cout << "\nIt should be quite clear that static members are indeed \"class-wide!!!\" <<
    endl;
    cout << "Note: calling a static member function, \"this\" pointer is not involved!!!\n\n";
    return 0;
}

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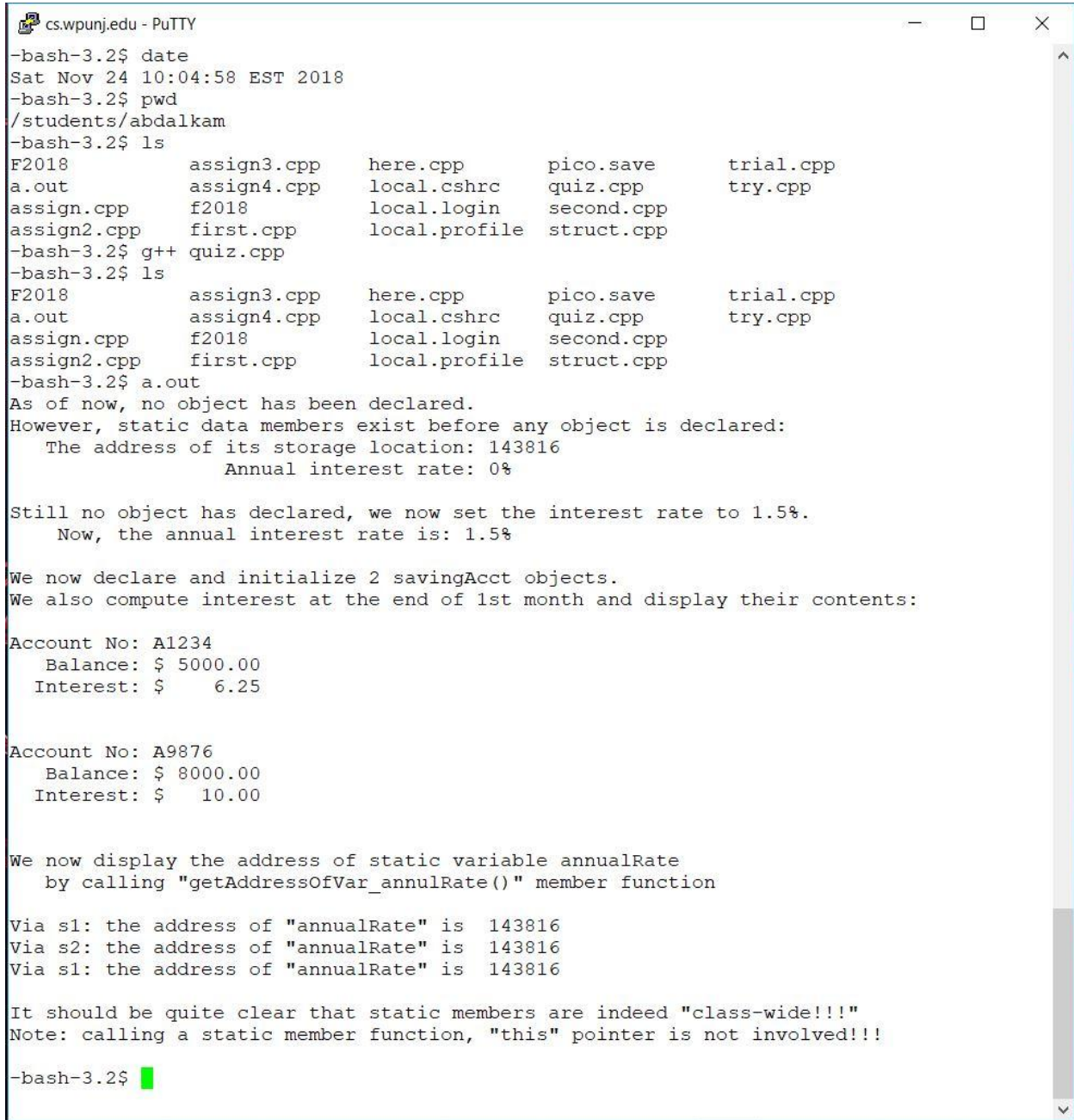
savingsAcct::savingsAcct()
{
    acctNo = "Nothing";
    balance = 0;
    savingsAcct::annualRate = 0;
    interest = 0;
}
savingsAcct::savingsAcct(string acctNum, double amt)
{
    acctNo = acctNum;
    balance = amt;
}
istream& operator>>(istream& in, savingsAcct &x)
{
    in >> x.acctNo >> x.balance;
    return in;
}
ostream& operator<<(ostream& out, const savingsAcct &x)
{
    cout << fixed << setprecision(2);
    out << "Account No: " << x.acctNo << endl;
    out << "  Balance: $ " << x.balance << endl;
    out << "  Interest: $ " << setw(7) << x.interest << endl;
    return out;
}
double *savingsAcct::getAddressOfVar_annulRate()
{
    double *address;
    address = &(savingsAcct::annualRate);
    return address;
}
double savingsAcct::getAnnualRate()
{
    return savingsAcct::annualRate;
}
void savingsAcct::setAnnualRate(double rate)
{
    savingsAcct::annualRate = rate;
}

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void savingsAcct::computeIntrest()
{
    interest = (balance * (1 + (savingsAcct::annualRate * 0.0833))) - balance;
}

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The screenshot shows a PuTTY terminal window titled "cs.wpunj.edu - PuTTY". The terminal displays the following commands and output:

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-bash-3.2$ date
Sat Nov 24 10:04:58 EST 2018
-bash-3.2$ pwd
/students/abdalkam
-bash-3.2$ ls
F2018          assign3.cpp    here.cpp       pico.save      trial.cpp
a.out          assign4.cpp    local.cshrc    quiz.cpp       try.cpp
assign.cpp      f2018          local.login    second.cpp
assign2.cpp     first.cpp      local.profile  struct.cpp
-bash-3.2$ g++ quiz.cpp
-bash-3.2$ ls
F2018          assign3.cpp    here.cpp       pico.save      trial.cpp
a.out          assign4.cpp    local.cshrc    quiz.cpp       try.cpp
assign.cpp      f2018          local.login    second.cpp
assign2.cpp     first.cpp      local.profile  struct.cpp
-bash-3.2$ a.out
As of now, no object has been declared.
However, static data members exist before any object is declared:
    The address of its storage location: 143816
        Annual interest rate: 0%

Still no object has declared, we now set the interest rate to 1.5%.
    Now, the annual interest rate is: 1.5%

We now declare and initialize 2 savingAcct objects.
We also compute interest at the end of 1st month and display their contents:

Account No: A1234
    Balance: $ 5000.00
    Interest: $   6.25

Account No: A9876
    Balance: $ 8000.00
    Interest: $  10.00

We now display the address of static variable annualRate
by calling "getAddressOfVar_annulRate()" member function

Via s1: the address of "annualRate" is 143816
Via s2: the address of "annualRate" is 143816
Via s1: the address of "annualRate" is 143816

It should be quite clear that static members are indeed "class-wide!!!"
Note: calling a static member function, "this" pointer is not involved!!!

-bash-3.2$

```