Computer Science Department
San Francisco State University
CSC 340
Spring 2016

Assignment 5 - More Inheritance and Polymorphism

Due Date
Wednesday, April 20, at midnight.

Overview
The purpose of this project is to complete the transition from imperative program to object oriented program, and add additional polymorphic behavior to a new class, **`BudgetEnvelope`**.

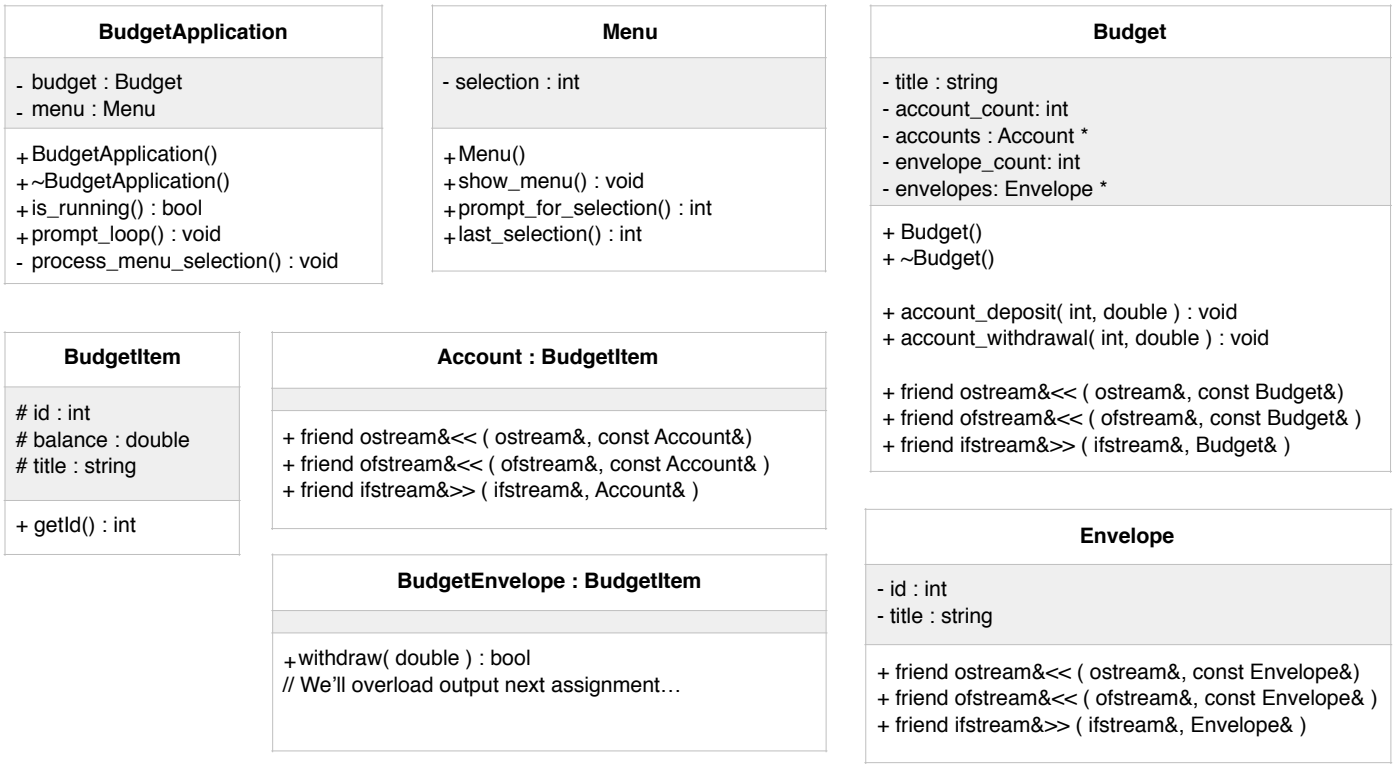
Submission
See the submission guidelines posted on iLearn.

Requirements
1. Define a new **`Menu`** class that encapsulates the behavior of a **`Menu`**, documented in the UML diagrams in Appendix A, including:
   1.1. **`Menu()`** - The default constructor for the **`Menu`** class. This should initialize the menu object's state to a valid state.
   1.2. **`show_menu()`** - Already implemented in previous assignment.
   1.3. **`prompt_for_selection()`** - Already implemented in previous assignment.
   1.4. **`last_selection()`** - An accessor to return the value of the **`selection`**.
2. Define a new BudgetApplication class that encapsulates the behavior of our BudgetApplication, documented in the UML diagrams in Appendix A, including:
   2.1. **`is_running()`** - Returns a **`bool`** value indicating if the application should continue to run.
   2.2. **`prompt_loop()`** - Encapsulates the behavior of a single user interaction loop.
   2.3. The constructor should initialize the private budget and menu members correctly (i.e. it should read the budget from file into the budget member).
   2.4. The destructor should correctly store the state of the application (i.e. it should store the budget to file).
3. Update the Budget object in preparation for storing months of budget envelopes:
   3.1. Add two new members, current_month and current_year.
   3.2. Update the input and output operators to read these fields from the file, and output them when the budget is displayed.
4. Define a new **`BudgetEnvelope`** class, a derived class of **`BudgetItem`**.
   4.1. Implement the required virtual method, whose implementation decrements the object's **`balance`**. If the withdrawal from the envelope would result in a negative **`balance`**, return **`false`**, and DO NOT PERFORM the withdrawal. Otherwise, return **`true`**.
5. Replace your driver file (**`main.cpp`**) with the code provided in the resources.

Resources

The makefile for this assignment can be found at https://gist.github.com/jrob8577/2aa923ae477ef63debdc3cc53c4fb027.

Appendix A: UML Diagrams



Appendix B: Budget File Format

File Format	Sample Data

TITLE
ENVELOPE_COUNT
ENVELOPE_ID ENVELOPE_TITLE
// Repeated up to ENVELOPE_COUNT
ACCOUNT_COUNT
ACCOUNT_ID ACCOUNT_TITLE
ACCOUNT_BALANCE
// Repeated up to ACCOUNT_COUNT
CURRENT_MONTH CURRENT_YEAR
	My Budget
	2
	1 Rent
	2 Groceries
	2
	345 Checking 10.00
	876 Savings 100.00
	4 2016

Note the output format of the decimals (precision is 2, decimal point shown).

Sample Output

User input is ***italicized, in bold***.

```
▷ make clean; make
```

```
rm -f *.o driver
g++ -std=c++11 -c -Wall main.cpp
g++ -std=c++11 -c -Wall budget_application.cpp
g++ -std=c++11 -c -Wall menu.cpp
g++ -std=c++11 -c -Wall budget.cpp
g++ -std=c++11 -c -Wall budget_item.cpp
g++ -std=c++11 -c -Wall account.cpp
g++ -std=c++11 -c -Wall envelope.cpp
g++ -std=c++11 -c -Wall budget_envelope.cpp
g++ -std=c++11 main.o budget_application.o menu.o budget.o
budget_item.o account.o envelope.o budget_envelope.o -o driver
▷ ./driver
----- NoSpacesInTitleBudget -----
Current Budget Month: 4 2016
2 Accounts:
789: Checking - 100.00
120: Savings - 55.55

2 Envelopes:
123: WoW
456: Groceries
1. Show Budget
2. Make Deposit
3. Make Withdrawal
0. EXIT
Enter your selection: 1
----- NoSpacesInTitleBudget -----
Current Budget Month: 4 2016
2 Accounts:
789: Checking - 100.00
120: Savings - 55.55

2 Envelopes:
123: WoW
456: Groceries
1. Show Budget
2. Make Deposit
3. Make Withdrawal
0. EXIT
Enter your selection: 2
Enter account ID: 789
Enter deposit amount: 123.45
----- NoSpacesInTitleBudget -----
Current Budget Month: 4 2016
2 Accounts:
789: Checking - 223.45
120: Savings - 55.55

2 Envelopes:
123: WoW
456: Groceries
1. Show Budget
2. Make Deposit
```

```
3. Make Withdrawal
0. EXIT
Enter your selection: 0
▷ cat budget
NoSpacesInTitleBudget
2
123 WoW
456 Groceries
2
789 Checking 223.45
120 Savings 55.55
4 2016
▷
```