

Analysis of a few functions and any embedded functions

Show code snippets with screenshots or copy/pasted code

Show : **deposit_coins,extract_exact_change,has_exact_change_for_coins**

And any other function that you think is useful for grading.

Coins.h

```
mscha1@barry-dylan:~/hw2
#include <iostream>

using namespace std;

const int CENTS_PER_QUARTER = 25, CENTS_PER_DIME = 10, CENTS_PER_NICKEL = 5;

class Coins{
private:
    int quarters, dimes, nickels, pennies;
public:
    Coins(int q, int d, int n, int p){
        quarters = q;
        dimes = d;
        nickels = n;
        pennies = p;
    }

    void deposit_coins( Coins & c ){
        quarters += c.quarters;
        dimes += c.dimes;
        nickels += c.nickels;
        pennies += c.pennies;

        c.quarters = 0;
        c.dimes = 0;
        c.nickels = 0;
        c.pennies = 0;
    }

    bool has_exact_change_for_coins( Coins c ){
        return quarters >= c.quarters && dimes >= c.dimes &&
            nickels >= c.nickels && pennies >= c.pennies;
    }

    Coins extract_exact_change( Coins c ){
        Coins extract_exact_change( Coins c ){
            if (has_exact_change_for_coins(c)){
                quarters -= c.quarters;
                dimes -= c.dimes;
                nickels -= c.nickels;
                pennies -= c.pennies;

                return Coins(c.quarters, c.dimes, c.nickels, c.pennies);
            } else {
                cerr << "NOT ENOUGH BALANCE" << endl;
                return Coins(0, 0, 0, 0);
            }
        }

        int total_value_in_cents(){
            return quarters*CENTS_PER_QUARTER + dimes*CENTS_PER_DIME +
                nickels*CENTS_PER_NICKEL + pennies;
        }

        void print( ostream & out ){
            cout << quarters << " quarters, " << dimes << " dimes, " <<
                nickels << " nickels, " << pennies << " pennies.";
            return;
        }

        int get_quarters(){
            return quarters;
        }

        int get_dimes(){
            return dimes;
        }

        int get_nickels(){
            return nickels;
        }
};

-- INSERT --
```


coins_main.cpp

```
mscha1@barry-dylan:~/hw/mw2
#include "Coins.h"

int dollars_to_cents(float dollar){
    return dollar * 100;
}

float coins_to_dollars(Coins c){
    return c.get_quarters()*0.25 + c.get_dimes()*0.1 +
           c.get_nickels()*0.05 + c.get_pennies()*0.01;
}

int main(){
    Coins pocket(5, 3, 6, 8);
    Coins piggybank(50, 50, 50, 50);
    cout << "Pocket: " << pocket << endl;
    cout << "Piggybank: " << piggybank << endl;
    cout << "Bought bag of chips for 68 cents" << endl;
    pocket.extract_exact_change(coins_required_for_cents(68));
    cout << "Pocket: " << pocket << endl;
    cout << "Transferred 2.08 dollars from piggybank to pocket" << endl;
    Coins cash = piggybank.extract_exact_change(coins_required_for_cents(
        dollars_to_cents(2.05)));
    pocket.deposit_coins(cash);
    cout << "Pocket: " << pocket << endl;
    cout << "Piggybank: " << piggybank << endl;
    cout << "Found loose change in sofa (10q, 10d, 10n, 10p)" << endl;
    Coins sofa(10, 10, 10, 10);
    cout << "Transferred to piggybank" << endl;
    piggybank.deposit_coins(sofa);
    cout << "Piggybank: " << "$" << coins_to_dollars(piggybank) << endl;
    return 0;
}
```

coins_menu.cpp

```
mscha1@barry-dylan:~/hw/mw2
#include <iostream>
#include "Coins.h"

using namespace std;

void presentMenu(){
    cout<< "*****\n"
    << "      COINS BANK MENU\n"
    << "*****\n"
    << "  OPTION                      ENTER\n"
    << "*****\n"
    << "  DEPOSIT CHANGE (in $)      D or d\n"
    << "  EXTRACT CHANGE(in $)      E or e\n"
    << "  PRINT BALANCE              B or b\n"
    << "  Quit                       Q or q\n"
    << "*****\n";
}

char getInput(){
    cout << "Enter a command character: " << endl;
    char cmd;
    cin >> cmd;
    return cmd;
}

int dollars_to_cents(float dollars){
    return dollars * 100;
}

void evaluateCommand(Coins & myCoins, Coins & transaction, char cmd){
    switch(cmd){
        case 'D': case 'd':
            float amount;
            cout << "DEPOSIT AMOUNT: ";
    }
```

```
mscha1@barry-dylan:~/hw2
void evaluateCommand(Coins & myCoins, Coins & transaction, char cmd){
    switch(cmd){
        float amount;
        case 'D': case 'd':
            cout << "DEPOSIT AMOUNT: ";
            cin >> amount;
            transaction = coins_required_for_cents(dollars_to_cents(amount));
            myCoins.deposit_coins(transaction);
            cout << "NEW BALANCE: " << myCoins << endl;
            break;

        case 'E': case 'e':
            cout << "EXTRACTION AMOUNT: ";
            cin >> amount;
            transaction = coins_required_for_cents(dollars_to_cents(amount));
            myCoins.extract_exact_change(transaction);
            cout << "NEW BALANCE: " << myCoins << endl;
            break;

        case 'B': case 'b':
            cout << "CURRENT BALANCE: " << myCoins << endl;
            break;

        case 'Q': case 'q':
            cout << "Exiting from Coin Bank" << endl;
            exit(0);
            break;

        default:
            cout << "Invalid command: " << cmd << endl;
            break;
    }
    return;
}

int main(){
    67,1 73%
    10:22 PM 1/24/2018
```

```
mscha1@barry-dylan:~/hw2
        case 'E': case 'e':
            cout << "EXTRACTION AMOUNT: ";
            cin >> amount;
            transaction = coins_required_for_cents(dollars_to_cents(amount));
            myCoins.extract_exact_change(transaction);
            cout << "NEW BALANCE: " << myCoins << endl;
            break;

        case 'B': case 'b':
            cout << "CURRENT BALANCE: " << myCoins << endl;
            break;

        case 'Q': case 'q':
            cout << "Exiting from Coin Bank" << endl;
            exit(0);
            break;

        default:
            cout << "Invalid command: " << cmd << endl;
            break;
    }
    return;
}

int main(){
    Coins myCoins(0, 0, 0, 0);

    while(true){
        Coins transaction(0, 0, 0, 0);
        presentMenu();
        char cmd = getInput();
        evaluateCommand(myCoins, transaction, cmd);
    }

    return 0;
}

77,2 Bot
    10:23 PM 1/24/2018
```

Successful execution with Valgrind screenshot

simple_main.cpp

```
mschal@barry-dylan:~/hw/hw2
*      Quit                               Q or q      *
*      *      *      *      *      *      *      *      *
Enter a command character:
q
Exiting from Coin Bank
mschal@barry-dylan 22:26:18 ~/hw/hw2
$ valgrind simple_main.cpp
valgrind: ./simple_main.cpp: Permission denied
mschal@barry-dylan 22:28:08 ~/hw/hw2
$ valgrind simple_main
==14755== Memcheck, a memory error detector
==14755== Copyright (C) 2002-2015, and GNU GPL'd, by Julian Seward et al.
==14755== Using Valgrind-3.12.0 and LibVEX; rerun with -h for copyright info
==14755== Command: simple_main
==14755==
I started with 100 quarters, 10 dimes, 10 nickels, 100 pennies. in my pocket
I bought a candy bar for 482 cents using 19 quarters, 0 dimes, 1 nickels, 2 pennies.
I have 81 quarters, 10 dimes, 9 nickels, 98 pennies. left in my pocket
==14755==
==14755== HEAP SUMMARY:
==14755==      in use at exit: 72,704 bytes in 1 blocks
==14755==    total heap usage: 1 allocs, 0 frees, 72,704 bytes allocated
==14755==
==14755== LEAK SUMMARY:
==14755==    definitely lost: 0 bytes in 0 blocks
==14755==    indirectly lost: 0 bytes in 0 blocks
==14755==    possibly lost: 0 bytes in 0 blocks
==14755==    still reachable: 72,704 bytes in 1 blocks
==14755==    suppressed: 0 bytes in 0 blocks
==14755== Rerun with --leak-check=full to see details of leaked memory
==14755==
==14755== For counts of detected and suppressed errors, rerun with: -v
==14755== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
mschal@barry-dylan 22:28:17 ~/hw/hw2
$
```

coins_main.cpp

```
mschal@barry-dylan:~/hw/hw2
==14755==
==14755== For counts of detected and suppressed errors, rerun with: -v
==14755== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
mschal@barry-dylan 22:28:17 ~/hw/hw2
$ valgrind coins_main
==14757== Memcheck, a memory error detector
==14757== Copyright (C) 2002-2015, and GNU GPL'd, by Julian Seward et al.
==14757== Using Valgrind-3.12.0 and LibVEX; rerun with -h for copyright info
==14757== Command: coins_main
==14757==
Pocket: 5 quarters, 3 dimes, 6 nickels, 8 pennies.
Piggybank: 50 quarters, 50 dimes, 50 nickels, 50 pennies.
Bought bag of chips for 68 cents
Pocket: 3 quarters, 2 dimes, 5 nickels, 5 pennies.
Transferred 2.08 dollars from piggybank to pocket
Pocket: 11 quarters, 2 dimes, 6 nickels, 5 pennies.
Piggybank: 42 quarters, 50 dimes, 49 nickels, 50 pennies.
Found loose change in sofa (10q, 10d, 10n, 10p)
Transferred to piggybank
Piggybank: $22.55
==14757==
==14757== HEAP SUMMARY:
==14757==      in use at exit: 72,704 bytes in 1 blocks
==14757==    total heap usage: 1 allocs, 0 frees, 72,704 bytes allocated
==14757==
==14757== LEAK SUMMARY:
==14757==    definitely lost: 0 bytes in 0 blocks
==14757==    indirectly lost: 0 bytes in 0 blocks
==14757==    possibly lost: 0 bytes in 0 blocks
==14757==    still reachable: 72,704 bytes in 1 blocks
==14757==    suppressed: 0 bytes in 0 blocks
==14757== Rerun with --leak-check=full to see details of leaked memory
==14757==
==14757== For counts of detected and suppressed errors, rerun with: -v
==14757== ERROR SUMMARY: 0 errors from 0 contexts (suppressed: 0 from 0)
mschal@barry-dylan 22:28:33 ~/hw/hw2
$
```

coins_menu.cpp

```
mscha1@barry-dylan:~/hw2
$ valgrind coins_menu
==14768== Memcheck, a memory error detector
==14768== Copyright (C) 2002-2015, and GNU GPL'd, by Julian Seward et al.
==14768== Using Valgrind-3.12.0 and LibVEX; rerun with -h for copyright info
==14768== Command: coins_menu
==14768==
* * * * *
*          COINS BANK MENU          *
* * * * *
* OPTION                               ENTER *
* * * * *
* DEPOSIT CHANGE (in $)                D or d *
* EXTRACT CHANGE(in $)                 E or e *
* PRINT BALANCE                        B or b *
* * * * *
* Quit                                Q or q *
* * * * *
Enter a command character:
d
DEPOSIT AMOUNT: 100.00
NEW BALANCE: 400 quarters, 0 dimes, 0 nickels, 0 pennies.
* * * * *
*          COINS BANK MENU          *
* * * * *
* OPTION                               ENTER *
* * * * *
* DEPOSIT CHANGE (in $)                D or d *
* EXTRACT CHANGE(in $)                 E or e *
* PRINT BALANCE                        B or b *
* * * * *
* Quit                                Q or q *
* * * * *
Enter a command character:
e
EXTRACTION AMOUNT: 50.00
NEW BALANCE: 200 quarters, 0 dimes, 0 nickels, 0 pennies.
* * * * *
*          COINS BANK MENU          *
* * * * *
* OPTION                               ENTER *
* * * * *
* DEPOSIT CHANGE (in $)                D or d *
* EXTRACT CHANGE(in $)                 E or e *
* PRINT BALANCE                        B or b *
* * * * *
* Quit                                Q or q *
* * * * *
Enter a command character:
b
CURRENT BALANCE: 200 quarters, 0 dimes, 0 nickels, 0 pennies.
* * * * *
*          COINS BANK MENU          *
* * * * *
* OPTION                               ENTER *
* * * * *
* DEPOSIT CHANGE (in $)                D or d *
* EXTRACT CHANGE(in $)                 E or e *
* PRINT BALANCE                        B or b *
* * * * *
* Quit                                Q or q *
* * * * *
Enter a command character:
q
Exiting from Coin Bank
==14768==
==14768== HEAP SUMMARY:
==14768==    in use at exit: 72,704 bytes in 1 blocks
new notifications
```


Test Output screenshots with descriptions of each test

simple_main.cpp

```
$ simple_main
I started with 100 quarters, 10 dimes, 10 nickels, 100 pennies. in my pocket
I bought a candy bar for 482 cents using 19 quarters, 0 dimes, 1 nickels, 2 pennies.
I have 81 quarters, 10 dimes, 9 nickels, 98 pennies. left in my pocket
mschal@barry-dylan 22:24:10 ~/hw/hw2
$
```

- Executed simple_main.cpp as outlined in hw2 problem 1

coins_main.cpp

```
$ coins_main
Pocket: 5 quarters, 3 dimes, 6 nickels, 8 pennies.
Piggybank: 50 quarters, 50 dimes, 50 nickels, 50 pennies.
Bought bag of chips for 68 cents
Pocket: 3 quarters, 2 dimes, 5 nickels, 5 pennies.
Transferred 2.08 dollars from piggybank to pocket
Pocket: 11 quarters, 2 dimes, 6 nickels, 5 pennies.
Piggybank: 42 quarters, 50 dimes, 49 nickels, 50 pennies.
Found loose change in sofa (10q, 10d, 10n, 10p)
Transferred to piggybank
Piggybank: $22.55
mschal@barry-dylan 22:24:55 ~/hw/hw2
$
```

- Executed coins_main.cpp as outlined in hw2 problem 2

coins_menu.cpp

```
mschal@barry-dylan:~/hw/hw2
$ coins_menu
* * * * *
*          COINS BANK MENU          *
* * * * *
* OPTION                             ENTER *
* * * * *
* DEPOSIT CHANGE (in $)              D or d *
* EXTRACT CHANGE(in $)               E or e *
* PRINT BALANCE                      B or b *
* * * * *
* Quit                               Q or q *
* * * * *
Enter a command character:
d
DEPOSIT AMOUNT: 10.76
NEW BALANCE: 43 quarters, 0 dimes, 0 nickels, 1 pennies.
* * * * *
*          COINS BANK MENU          *
* * * * *
* OPTION                             ENTER *
* * * * *
* DEPOSIT CHANGE (in $)              D or d *
* EXTRACT CHANGE(in $)               E or e *
* PRINT BALANCE                      B or b *
* * * * *
* Quit                               Q or q *
* * * * *
Enter a command character:
e
EXTRACTION AMOUNT: 15.65
NOT ENOUGH BALANCE
NEW BALANCE: 43 quarters, 0 dimes, 0 nickels, 1 pennies.
* * * * *
*          COINS BANK MENU          *
* * * * *
```

- Deposited \$10.76 dollars to the coin bank.
- Unable to extract \$15.65 dollars from the coin bank. Error: NOT ENOUGH BALANCE appeared.


```
mscha1@barry-dylan:~/hw/hw2
* * * * *
*          COINS BANK MENU          *
* * * * *
* OPTION                             ENTER *
* * * * *
* DEPOSIT CHANGE (in $)              D or d *
* EXTRACT CHANGE(in $)               E or e *
* PRINT BALANCE                      B or b *
* * * * *
* Quit                               Q or q *
* * * * *
Enter a command character:
e
EXTRACTION AMOUNT: 5.4
NOT ENOUGH BALANCE
NEW BALANCE: 43 quarters, 0 dimes, 0 nickels, 1 pennies.
* * * * *
*          COINS BANK MENU          *
* * * * *
* OPTION                             ENTER *
* * * * *
* DEPOSIT CHANGE (in $)              D or d *
* EXTRACT CHANGE(in $)               E or e *
* PRINT BALANCE                      B or b *
* * * * *
* Quit                               Q or q *
* * * * *
Enter a command character:
m
Invalid command: m
* * * * *
*          COINS BANK MENU          *
* * * * *
* OPTION                             ENTER *
* * * * *
```

- Extracted \$5.4 dollars from the coin bank.

```
mscha1@barry-dylan:~/hw/hw2
Enter a command character:
e
EXTRACTION AMOUNT: 5.4
NOT ENOUGH BALANCE
NEW BALANCE: 43 quarters, 0 dimes, 0 nickels, 1 pennies.
* * * * *
*          COINS BANK MENU          *
* * * * *
* OPTION                             ENTER *
* * * * *
* DEPOSIT CHANGE (in $)              D or d *
* EXTRACT CHANGE(in $)               E or e *
* PRINT BALANCE                      B or b *
* * * * *
* Quit                               Q or q *
* * * * *
Enter a command character:
m
Invalid command: m
* * * * *
*          COINS BANK MENU          *
* * * * *
* OPTION                             ENTER *
* * * * *
* DEPOSIT CHANGE (in $)              D or d *
* EXTRACT CHANGE(in $)               E or e *
* PRINT BALANCE                      B or b *
* * * * *
* Quit                               Q or q *
* * * * *
Enter a command character:
q
Exiting from Coin Bank
mscha1@barry-dylan 22:26:18 ~/hw/hw2
$
```

- Entered invalid command “m”.

