C++ Programming Assignment (#11)

Date: Jun. 2, 2016
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Due date: Jun. 8, 2016

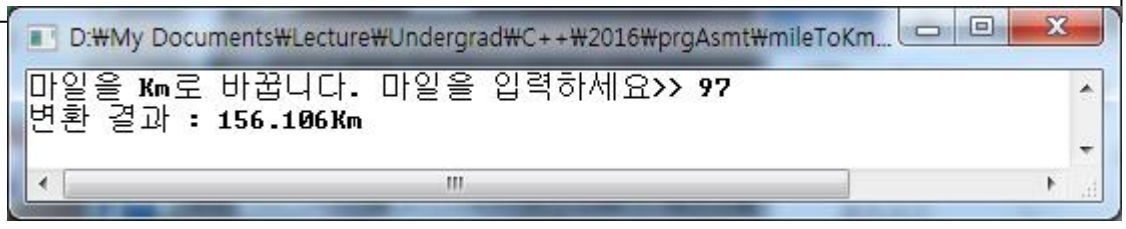
Programming Projects

1. The abstract class `Converter` performs unit conversion.

```
class Converter {
protected:
    double ratio;
    virtual double convert(double src)=0; // src를 다른 단위로 변환
    virtual string getSourceString()=0; // 변환할 원단위 명칭
    virtual string getDestString()=0; // 변환될 단위 명칭
public:
    Converter(double r) { ratio = r; }
    void run() {
        double src;
        cout << getSourceString() << "을 " << getDestString() << "로 바꿉니다. ";
        cout << getSourceString() << "을 입력하세요>> ";
        cin >> src;
        cout << "변환 결과 : " << convert(src) << getDestString() << endl;
    }
};
```

Derive the class `MileToKm` from `Converter`, which converts mile to Km. The example of the function `main()` and its result are as follows:

```
int main() {
    MileToKm mk(1.609344); // 1 mile = 1.609344 Km
    mk.run();
    return 0;
};
```



2. The following shows code to play a guessing game in which two players attempt to guess a number. (The number is ranged from 1 to 100.) Your task is to **extend the program with objects that represent either a human player or a computer player**.


```
bool checkForWin(int guess, int answer)
{
  if (answer == guess){
     cout << "You're right! You win!" << endl;
     return true;
  }
  else if (answer < guess)
     cout << "Your guess is too high." << endl;
  else
     cout << "Your guess is too low." << endl;
  return false;
}


void play(Player &player1, Player &player2)
{
  int answer = 0, guess = 0;
  answer = rand() % 100 + 1;
  bool win = false;

  while (!win)
  {
   cout << "Player 1's turn to guess." << endl;
   guess = player1.getGuess();
   win = checkForWin(guess, answer);
   if (win) return;

   cout << "Player 2's turn to guess." << endl;
   guess = player2.getGuess();
   win = checkForWin(guess, answer);
  }
}
```

The `play` function takes as input two `Player` objects. Define the `Player` class with a **pure virtual function** named **`getGuess()`**.

Next, define a class named `HumanPlayer` derived from `Player`. The implementation of `HumanPlayer::getGuess()` should prompt the user to enter a number and return the value entered from the keyboard.

Next, define a class named `ComputerPlayer` derived from `Player`. The implementation of `ComputerPlayer::getGuess()` should randomly select a number from 1 to 100.

Finally, construct a main function that invokes `play(Player &player1, Player &player2)` with two instances of a `HumanPlayer` (human versus human), an instance of a `HumanPlayer` and `ComputerPlayer` (human versus computer), and two instances of `ComputerPlayer` (computer versus computer). **[Modified from Project 5, Chapter 15, Absolute C++ 5ed.]**

Sample dialogue:

```
** Human vs. Human **
Player 1's turn to guess.
50
Your guess is too high.
Player 2's turn to guess.
25
Your guess is too low.
Player 1's turn to guess.
38
Your guess is too low.
Player 2's turn to guess.
44
Your guess is too high.
Player 1's turn to guess.
41
Your guess is too low.
Player 2's turn to guess.
42
You're right! You win!

** Human vs. Computer **
Player 1's turn to guess.
50
Your guess is too low.
Player 2's turn to guess.
The computer guesses 35
Your guess is too low.
Player 1's turn to guess.
75
Your guess is too high.
Player 2's turn to guess.
The computer guesses 1
Your guess is too low.
Player 1's turn to guess.
68
You're right! You win!


** Computer vs. Computer **
Player 1's turn to guess.
The computer guesses 25
Your guess is too low.
Player 2's turn to guess.
The computer guesses 79
Your guess is too high.
Player 1's turn to guess.
The computer guesses 59
Your guess is too low.
Player 2's turn to guess.
The computer guesses 63
Your guess is too low.
Player 1's turn to guess.
The computer guesses 65
Your guess is too low.
Player 2's turn to guess.
The computer guesses 6
Your guess is too low.
                ⋮
Player 1's turn to guess.
The computer guesses 39
Your guess is too low.
Player 2's turn to guess.
The computer guesses 70
You're right! You win!
```