Project 1
Wheel of Fortune

CSC 17C - 48948

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Date: 10/29/2017

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Introduction

For this project I have chosen to revisit a game I am familiar with and enjoy. I previously wrote a Wheel of Fortune for CSC 17A, but this effort is much better. This time around I aimed to utilize the STL Library to improve performance and decrease line counts while increasing the number of features. This project was not overly difficult, but it took a good effort to learn and utilize a library that I had no familiarity with. As I was learning these new constructs, I had to consult several texts to properly implement the STL library. The end result is a game that I am proud of.

Input Validation

The menus in this game are self-explanatory and easy to navigate. All inputs are validated and are not case sensitive. Options that have a “(default)” label are selected if the user types an invalid input.

Tutorial

If a save file is detected, you will have to option to continue. If do you not continue a save file, you will input your name and start with $500.00 and 0 Points. You will then be taken to a menu with four options.

```
Select an option below:
 1. Begin a new game of Wheel of Fortune
 2. View the leaderboard
 3. Append to the Library
 4. View the Library(You'll spoil all the answers!)
```

Playing a Game:

To win, you must guess the phrase; if you run out of money, you lose. Once you begin playing, you are given a category and phrase to guess. Displayed will be your hidden phrase with spaces, used/unused letters, and your money. Select an appropriate option to continue.

```
Song Title
□□□□□□□□ □□ □□□□□□
Your keyboard:
ABCDEFGHIJKLM
NOPQRSTUVWXYZ
Your money = $500.00


What would you like to do?
 1. Spin the Wheel ✪
 2. Buy a vowel ($500.00)
 3. Solve the Puzzle ✉(Bad guess lose $300.00)
```

Spin the Wheel:

After spinning, you will be displayed a monetary value. If you correctly guess a letter, you will be awarded that amount of money and gain 10 points for each letter in the phrase that matched, else if you guess incorrectly, you will lose that amount. You can

keep guessing if you have not used all the letters. Every letter you used will be blacked out and each letter you correctly guessed will be displayed.

```
You spun $100.00
Movie
TH□ T□□□□□□T□□

Your keyboard:
A■■DEFG■IJK■M
NO■QR■■■VWXYZ

What letter do you want to use?
```

Buy a Vowel:

You will be displayed the same graphics as above, except you must buy a vowel. You will lose $500.00 for buying a vowel.

```
Which vowel do you want to buy? u
You have bought a vowel for $500.00
```

Solve the Puzzle:

Input the phrase you think is the answer. It is not case sensitive, but you do need to correctly match all the letters and spaces. If you incorrectly guess, you will lose $300.00; if you correctly guess, you will gain 30 points for each hidden letter revealed. You will then be displayed the amount of money left in your account and current amount of points you have earned.

```
Movie
TH□ T□RM□N□T□R

Your keyboard:
A■■DEFG■IJK■■
■O■Q■■■■VWXYZ

Input the final answer: the terminator

You gain 30 points for each hidden letter you guessed
You gain 150 points
Congrats you win!
```

Losing and Leaderboard:

If you run out of money, the correct phrase will be displayed. You lose the game and have to exit the program to play again. You will have the option to put your score in the leaderboard.

```
You did not guess correctly. You have lost $300.00
The phrase was actually:
STAIRWAY TO HEAVEN
You have no money.
You must restart the game to play again
```

If you lost, you can exit the program through the menu and input your score to the leaderboard.

```
Do you wish to add your score to the leaderboard?
Input 1 to add
Input 2 to exit(default):
```

If you still have money you can save your game and continue later.

```
Thanks for playing Javier!
Your final score: 360 points
Do you wish to save?
1.Save
2.Exit without saving(default)
```

Project Summary

Project size	**1176 Lines**
Lines of code	839 Lines
Comment/Blank lines	337 Lines

I slowly implemented the STL library because I was not familiar with it. In each version I tried to utilize more and more concepts from it. Like most programming efforts, there were many bugs for each version that I had to fix. A difficulty I had was taking chunks of code and replacing it with a required construct. It was hard to test out since many class functions depended on others.

At the end of development, I felt complete. However, there may be some more improvements that I can make or features that I can implement. If I do decide to modify, some ideas include speed rounds and bonus rounds. I can also make more use of the algorithm functions. You can see previous versions of this program on the github link.

https://github.com/javierborja95/CSC17C

Unsolved issue: Very rarely the clues don't read in properly. Attempting to play will show an extremely long array of blocks. I cannot pinpoint the source to the problem.

Version 1

In this working version, the only STL library constructs implemented were queues, a vector iterator, and a single algorithm.

Version 2

In this version I implemented maps for the clue categories while cleaning up some of the code.

Version 3

This version was mostly touch up by getting rid of unnecessary dynamic memory allocation. I also edited code here and there.

Version 4

I successfully implemented lists for letters and phrases. Began to implement extra sorting options.

Version 5

Here I added load/saving and implemented queues again while replacing one queue with a stack. I also added several sorting algorithms for different types of sorting.

Project Requirements:

Maps	✓
Sets	✓
Lists	✓
Stacks	✓
Queues	✓
Iterators	✓
Algorithms	✓

While requirements were to utilize the STL Library, I have included many more concepts that I learned in CSC-5 and CSC-17A, including arrays, pointers, strings, structures, classes and inheritance, and exceptions. I have included every required construct and I will go in detail to show where in code the required constructs are used plus some comments that I had about the STL library.

You can find the examples by searching the final pages with ctrl-f.

Concept	Examples	Comments
Maps	map<int, string> catg; catg[1]="TV Show"; cout<<catg[categry]<<endl;	These were useful because I did not have to do any if else statements or switch statements to access categories, since they are already numbered.
Sets	set<Player,greater<Player>> arr; set<Clue> tset; tset.insert(clue);	These were utilized for organizing players on the leaderboard and clues since they automatically sort themselves. I had to overload the < operator to get these to work correctly.

Lists	list<Letter> arr;
	arr.push_back(s[i]);
	p->use();
		I used it for Keyboard/Phrase classes since they are made up of Letter classes. I didn't need to random access these, I just iterated through them.

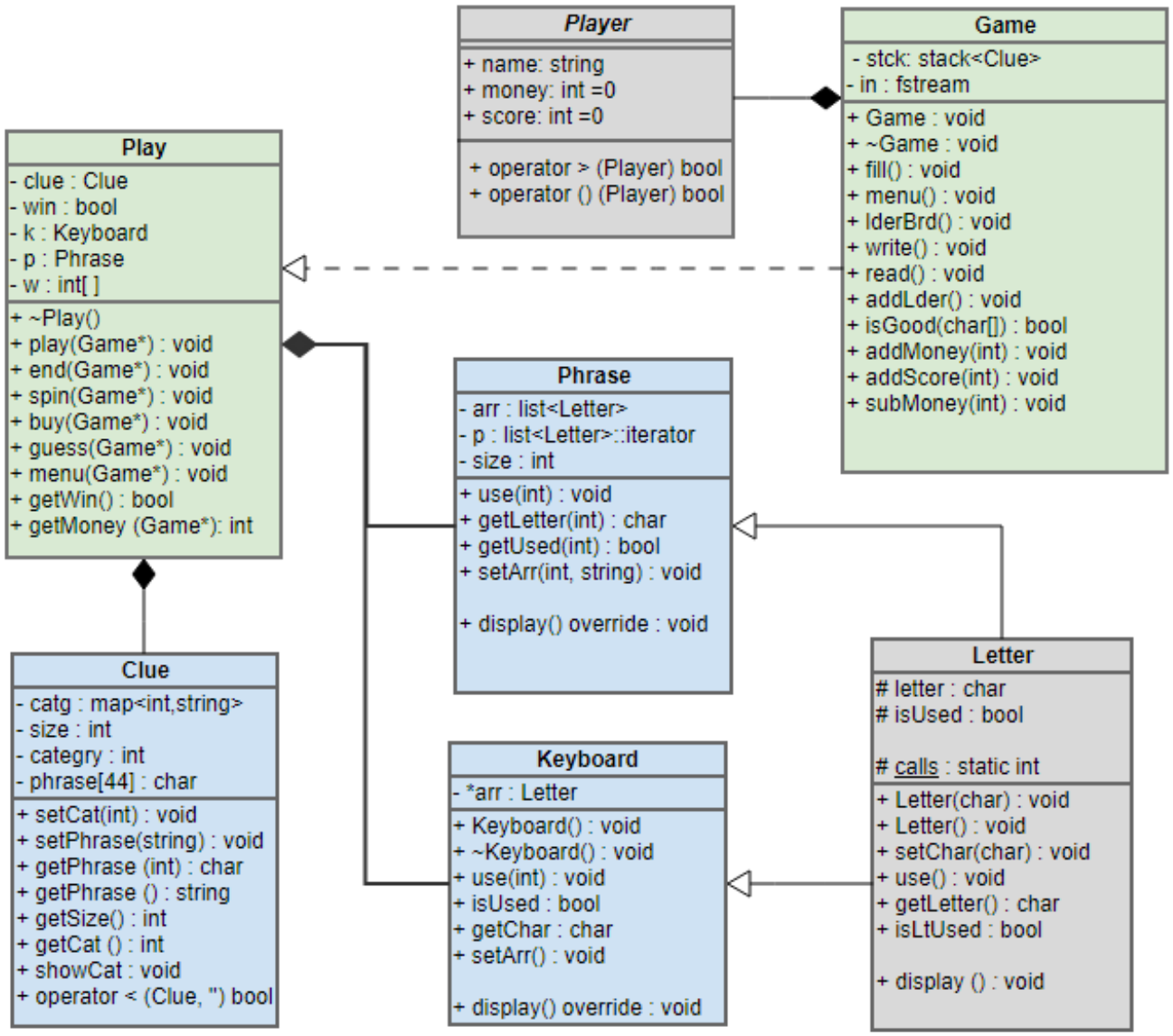
Stacks	stack <Clue> stck;
	this->stck.push(*p);
	temp=a->stck.top();
	a->stck.pop();
		These were highly useful because after importing the clues and phrases, I had to access them and then pop them off so they don't repeat.

Queues	queue<Clue> que; while(!que.empty()) {clue=que.front(); que.pop();	I could have used stacks as well but I utilized it to read clues through a file and I utilized these clues in the order that I read them in.

Iterators	list<Letter>::iterator p;
	p=arr.begin(); advance(p,i);
	for(p=arr.begin();p!=arr.end();p++)
		I used a lot of iterators to go through the many containers in my program. I learned the hard way that iterating through a queue is not possible, but that concept makes sense.

Algorithms	sort(a.begin(),a.end(),name_sort()); random_shuffle(arr.begin(),arr.end());	These were great at cutting down blocks of code into single lines. I felt like I did not use a lot of Algorithms, but their uses were very helpful.
Vector	vector<Clue> arr; arr.push_back(temp); vector<Player>::iterator p;	Not really a requirement, but these are also STL containers. I used them a lot because they are highly versatile.

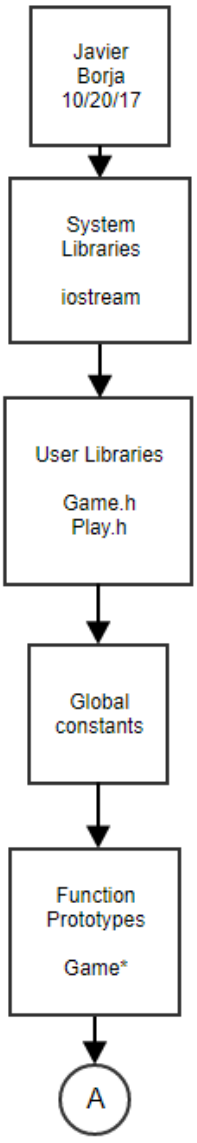
Class/UML Diagrams

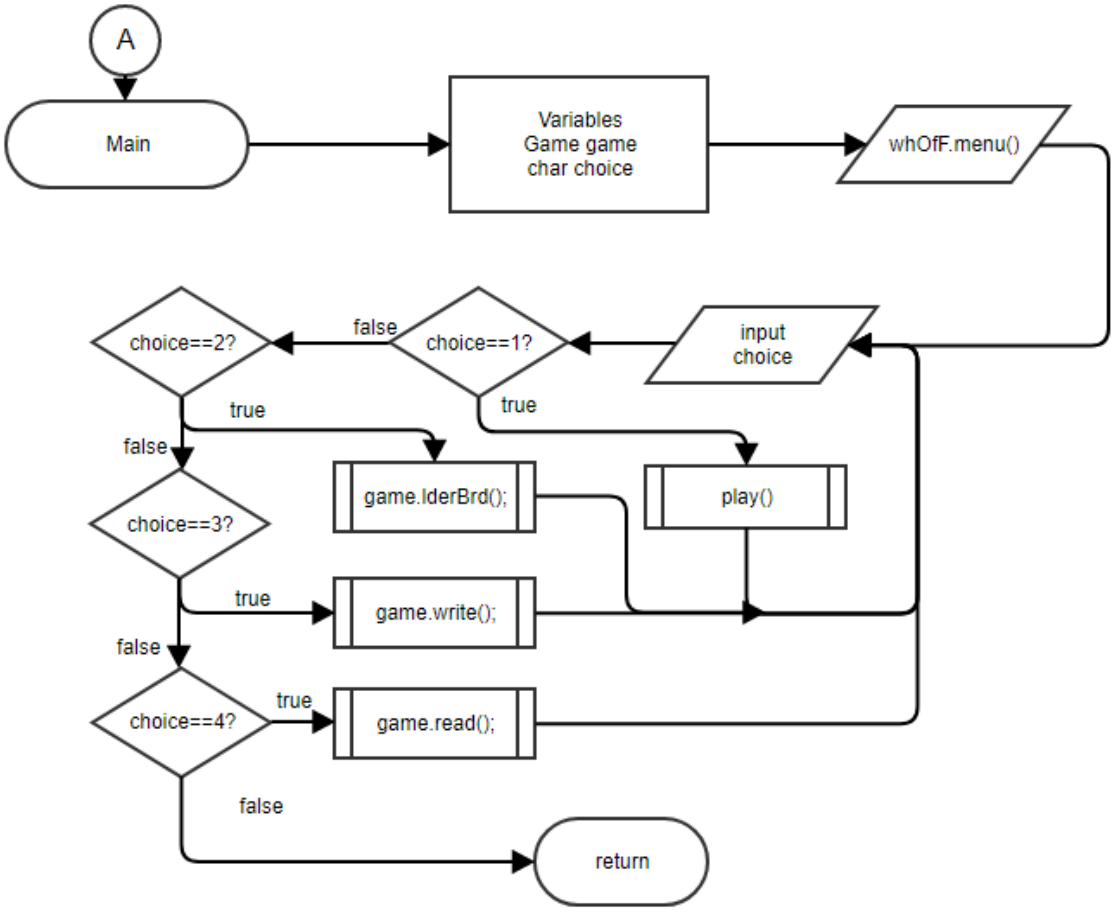


Pseudocode and Flowcharts

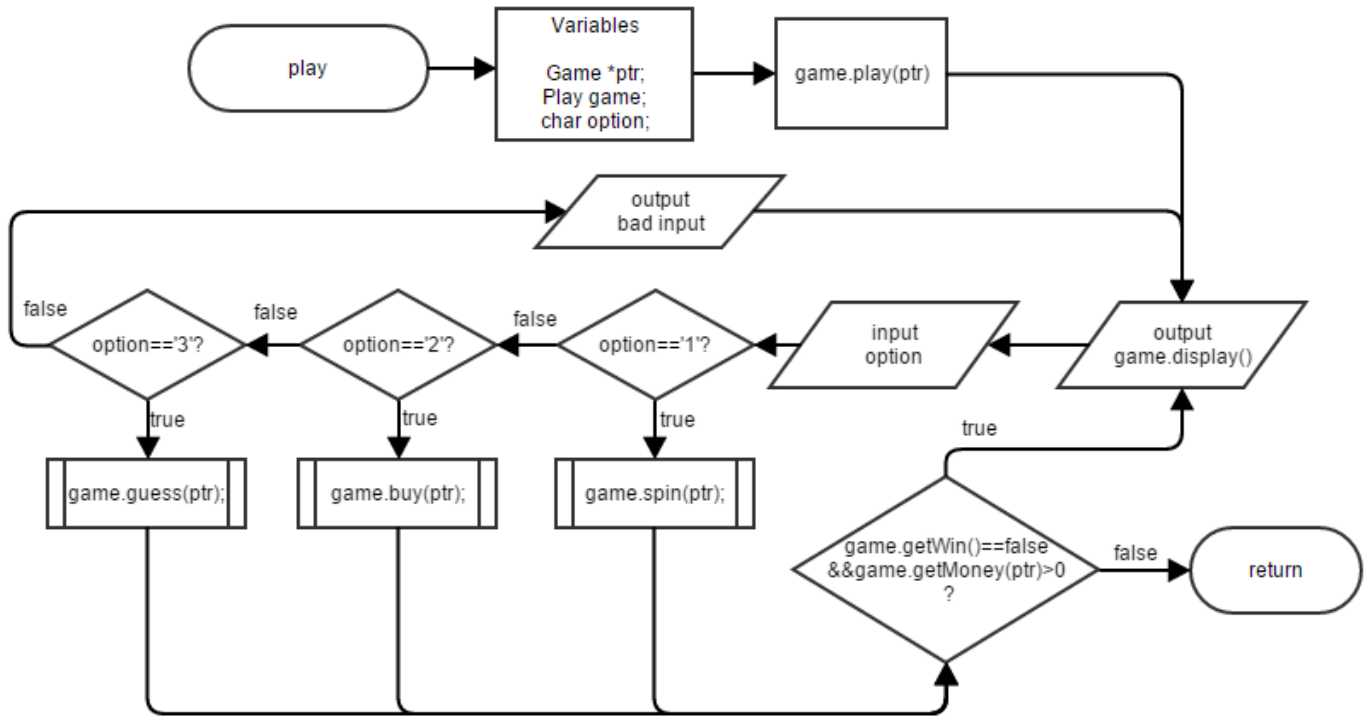
Main:

Create a Game object
Show Game.menu
Input menu choice
Do{
  Switch(choice)
    Case 1: Play()
    Case 2: Game.leaderBrd()
    Case 3: Game.write()
    Case 4: Game.read()
}While (choice is 1-4)

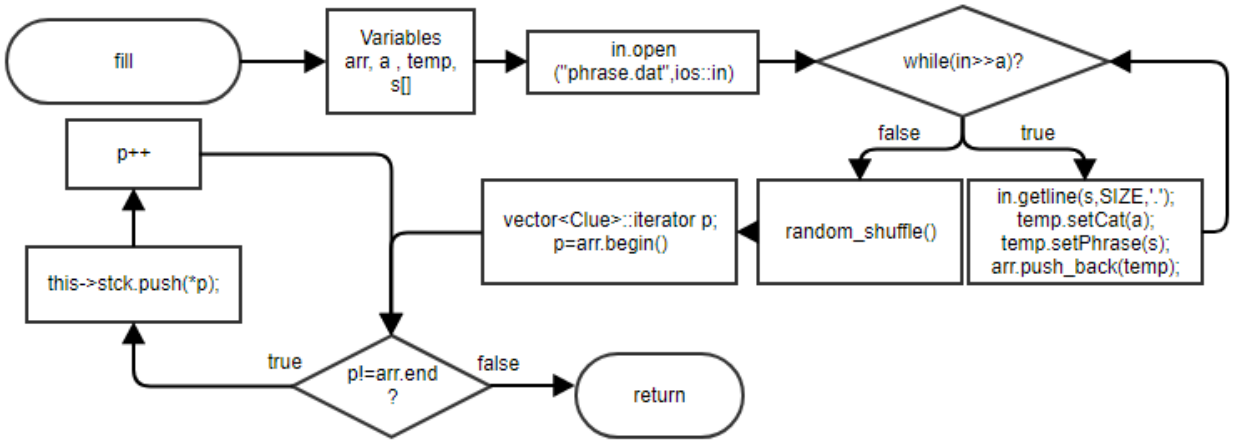




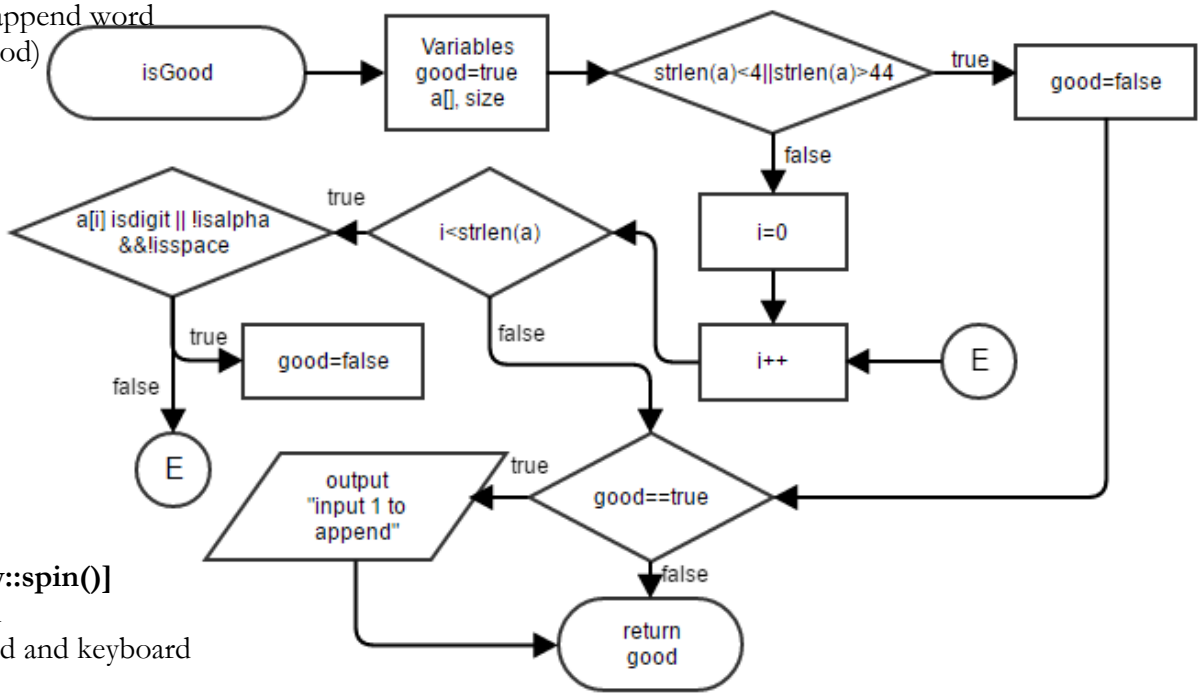
Play:
Create Play object
object.play(this)
Do{
    Output display()
    Input option
    Switch(option){
        Case 1: object.spin()
        Case 2: object.buy()
        Case 3: object.guess()
        Default: Output error message
    }
}While(object.getWin()==false and object.getMoney(this) is greater than 0)



Fill: [Game::fill()]
Open phrase file
While(reading from file)
  Set temporary clues
  Push temp into array
Shuffle array
For(beginning of array, not end of array, iterator++){
  Push into stack
} return array

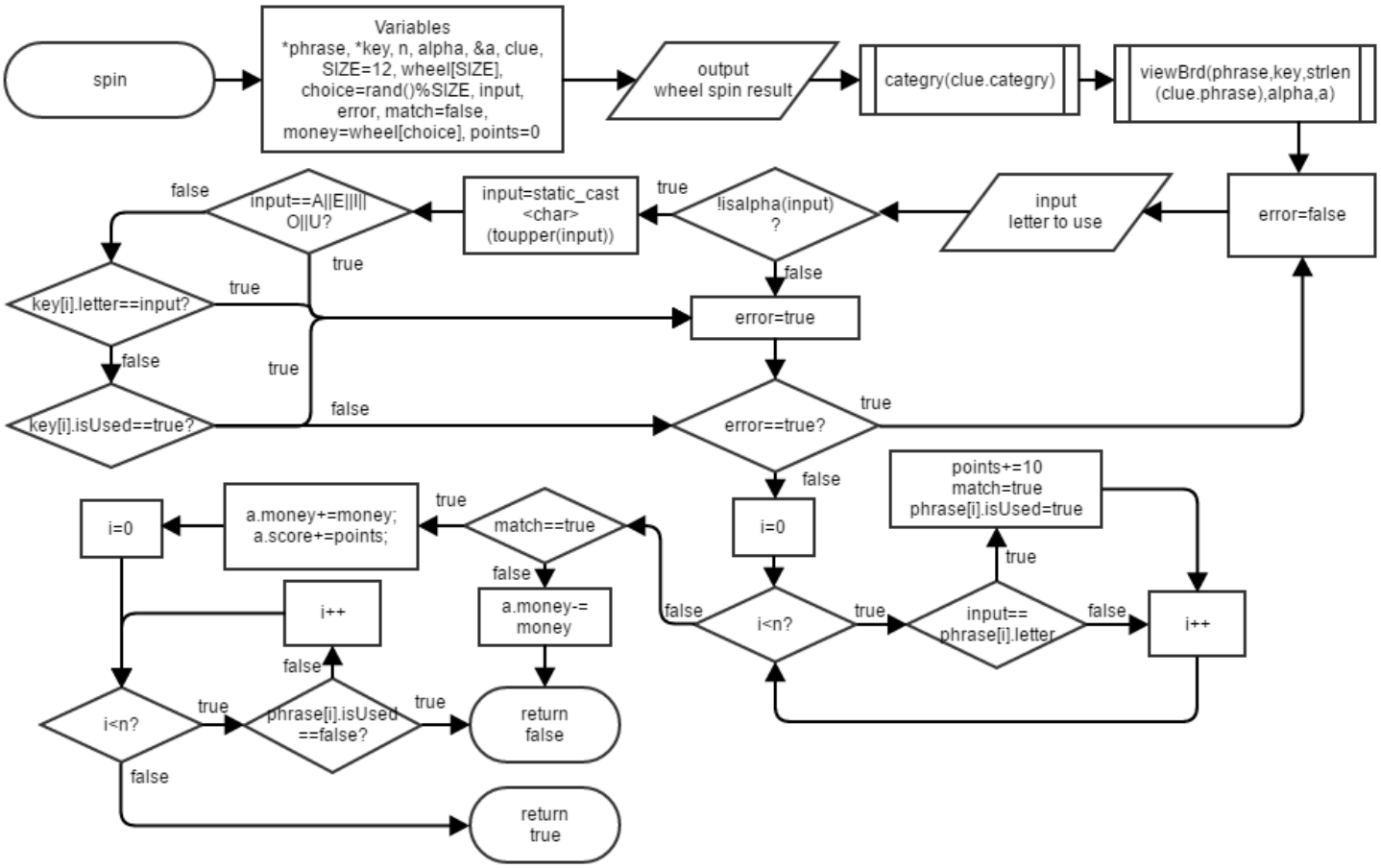


isGood:[Game::isGood()]
(Is length of string <4||>44?)
T: Good=false
F: For(i=0;i<length of string;i++){
  (If character is not letter or space) good=false
If(good==true)
T: Ask to append word
Return (good)



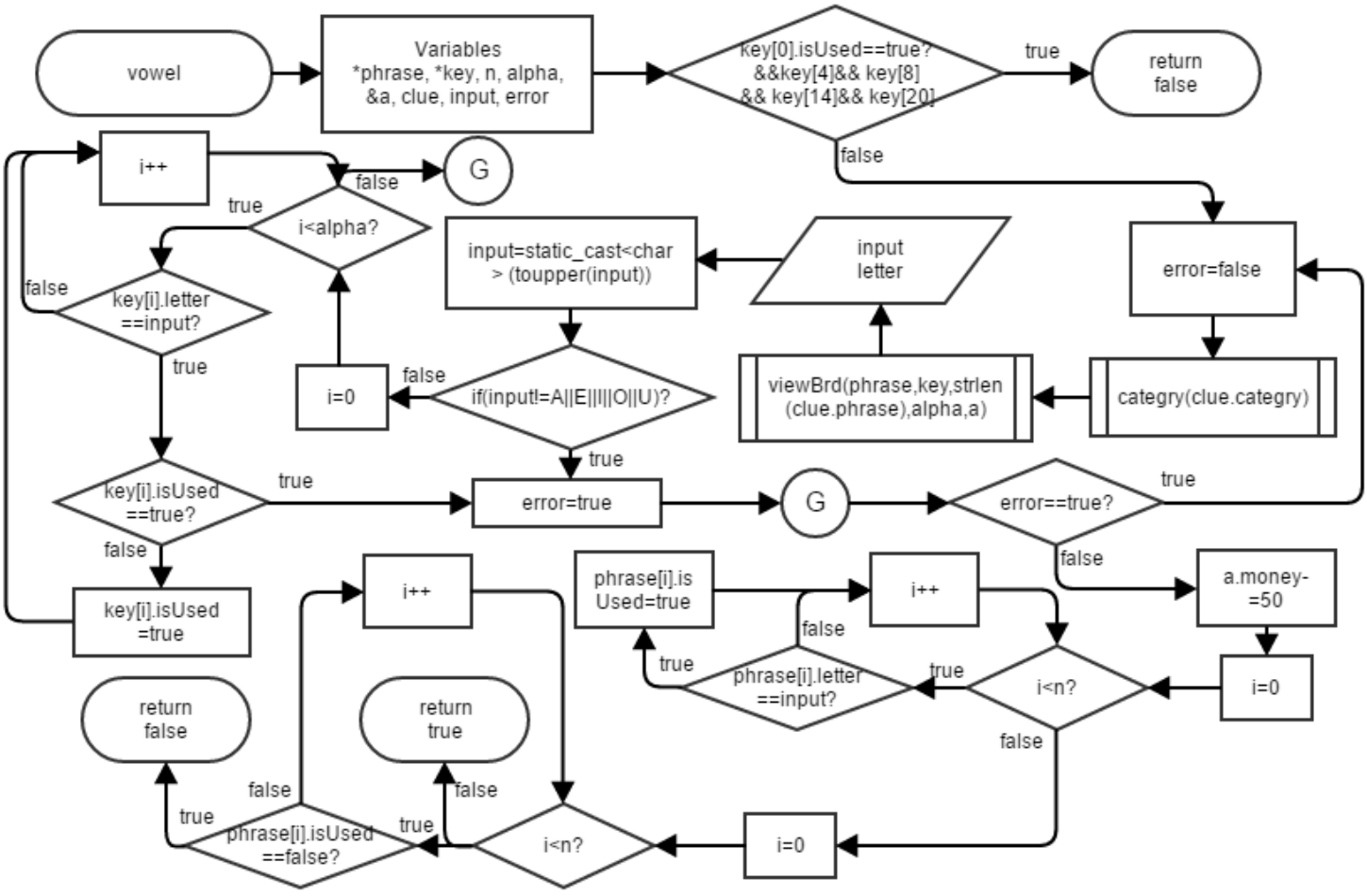
Spin:[Play::spin()]
Spin wheel
Show board and keyboard

Do{
Error=false
Input letter to use
(is letter==vowel||non alphabet||or already used?)
Error=true
While(error==true)
If(letter input==hidden letter)
T: {add points
Match=true}
If(match==true)
T:{Add money
Add points to score
Make hidden letters shown
(If all letters revealed) Return win
}
F: lose money, return loss



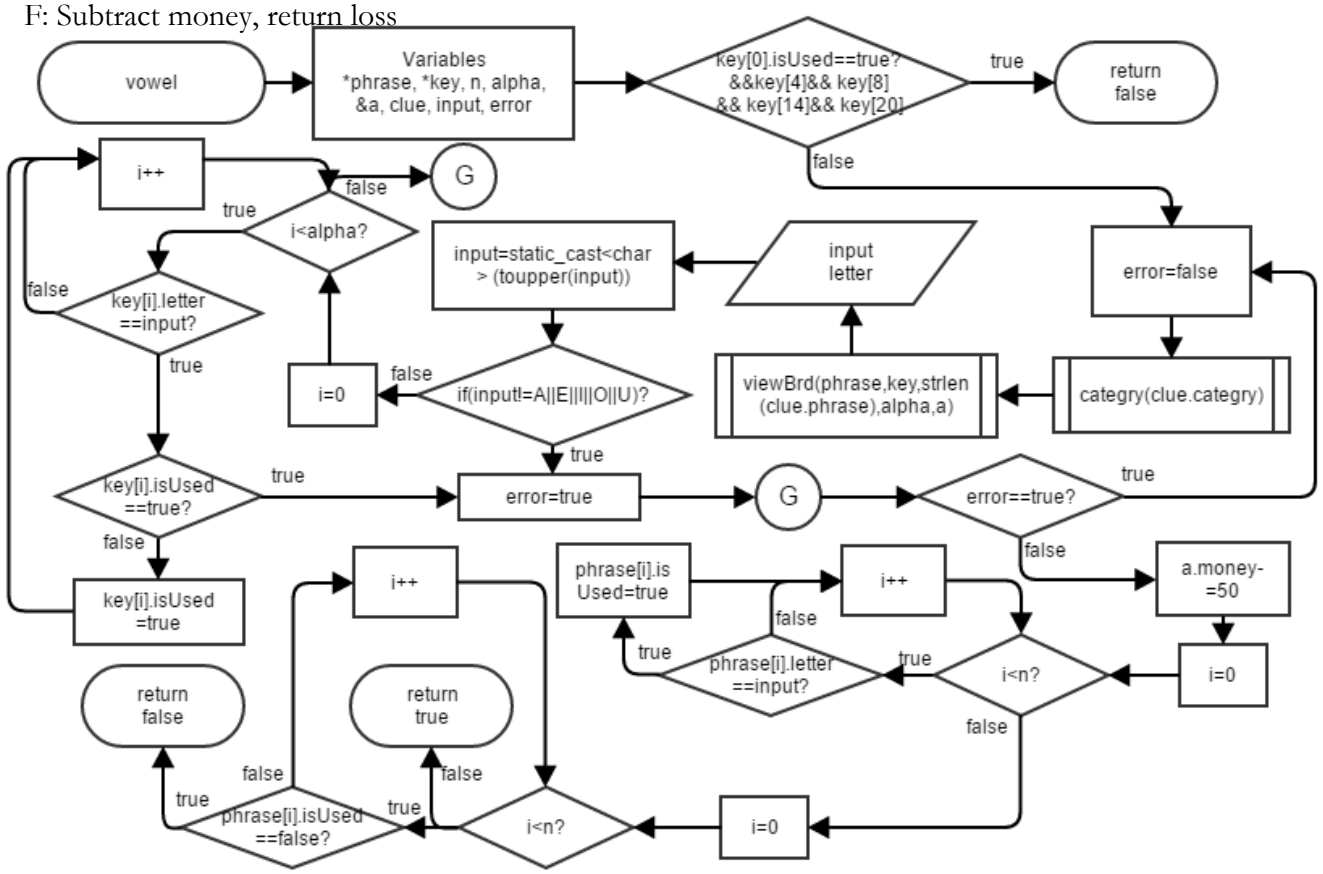
Vowel: [Play::buy()]
(if all vowels are used) return
Do{
Error =false

Show board and keyboard
Input letter
(if input is not vowel)
Error =true
(if vowel is used)
T: error =false
F: make key used
While(error==true)
Subtract money
Reveal vowels from phrase
(If all letters are revealed) return win
Else return loss

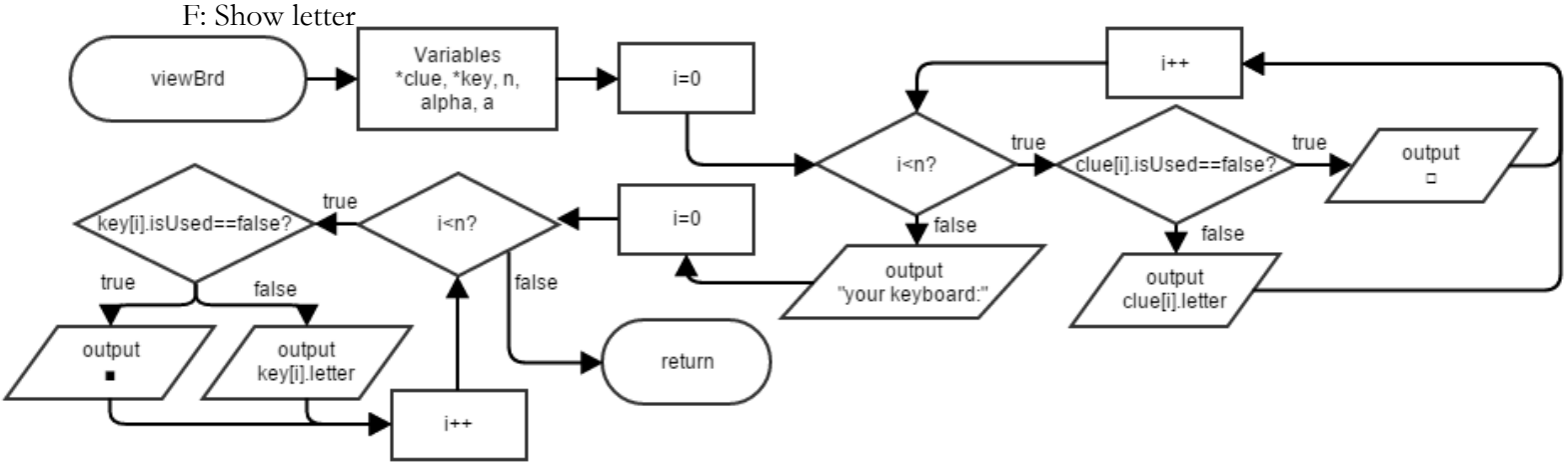


Guess:[Play::guess()]
Show board and keyboard
Input phrase

(if input matches board phrase)
T: Return win
F: Subtract money, return loss

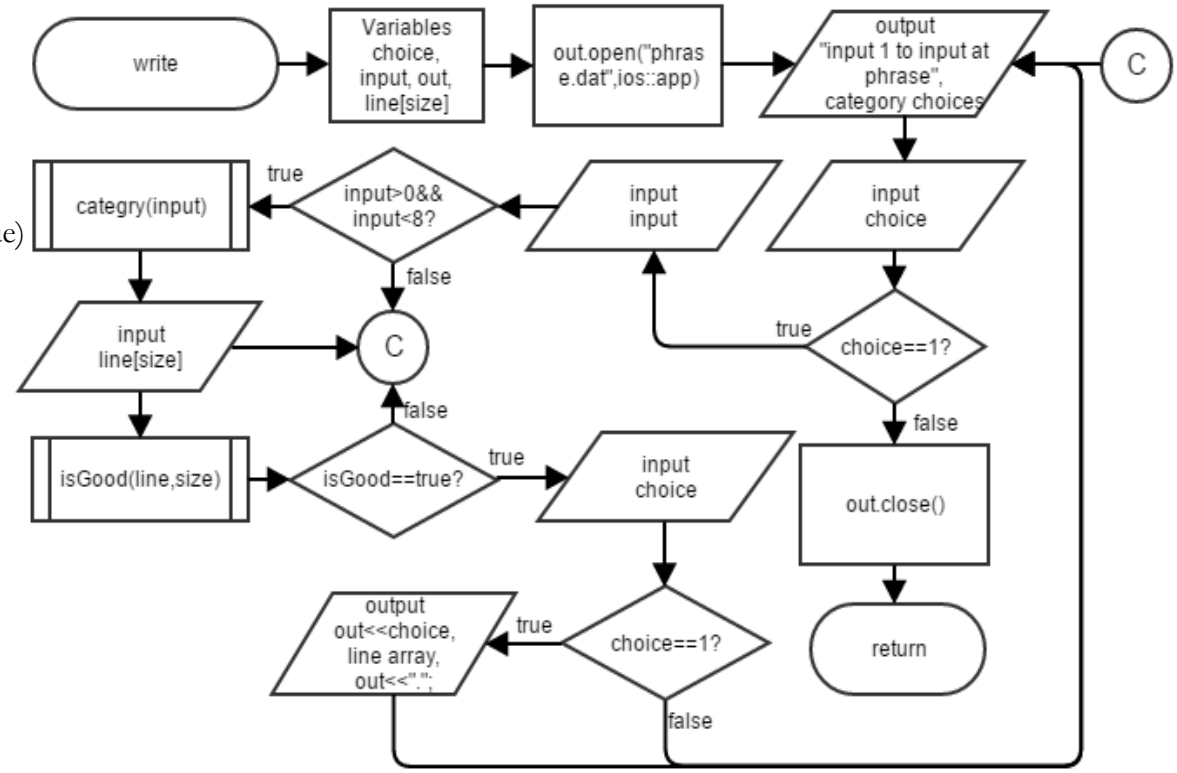


viewBrd:[Play::display][Keyboard::display()][Phrase::display()]
(If phrase letter is hidden)
T: Show square
F: Show letter
(If keyboard letter is used)
T: Show square
F: Show letter



Write: [Game::write()]

Open file to append
Input category
Input phrase
isGood(phrase)
(if good)
    T:Ask to input
    Input choice
    (If choice is true)
        write to file
Close file



Major Variables:

Local variables of different member functions are not included.

Type	Variable Name	Description	Location
Player	user	Contains user name, money and score	Game.h, Play.h
stack <Clue>	stck	A stack of clues	Game.h
map <int, string>	catg	Map of categories	
int	size	Generic variable that shows size	Clue.h, Letter.h
Game	game	Wheel of fortune game object	main
int	category	Number to represent a category	Clue.h
char [ ]	phrase	Phrase	Clue.h
string	name	Name of player	Player.h
int	money	Money	Player.h
int	score	Score	player.h
Clue	clue	Holds category and clue phrase	Play.h
bool	win	Represents whether one lost	Play.h
Keyboard	k	A keyboard object	Play.h
Phrase	p	A phrase object	Play.h
int [ ]	w	Wheel spin options	Play.h
list <Letter>	arr	List of letters	Keyboard.h, Phrase.h
list<Letter>::iterator	p	Iterator to travers list	Keyboard.h, Phrase.h
char	letter	A single character that letter represents	Letter.h
bool	isUsed	Shows whether to reveal or hide letter	Letter.h
fstream	in	General input from files	Game..h

References:

Savitch, Walter. (2014) *Problem Solving with C++*. Pearson

--For STL introduction

https://www.sgi.com/tech/stl/

--Extra information on STL

http://wheeloffortuneanswer.com/

--Copied phrases to fill dictionary

Source Code:

```
/* File:   Game.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Class Specification File for Game class
 */

#ifndef GAME_H
#define GAME_H

//System Libraries
#include <iomanip>   //Output manipulation
#include <vector>    //Vectors
#include <algorithm> //For performing some algorithm functions
#include <stack>     //Stacks
#include <iterator>  //Iterator
#include <set>       //Sets
#include <queue>     //Queues
using namespace std; //Namespace of the System Libraries

//User Libraries
#include "Player.h"
#include "Clue.h"

//Variables
const int SIZE=44; //Max Size of Char array

class Game{
   private:
      Player user;       //The player
      stack <Clue> stck; //A stack of clues
      fstream in;        //Input

   public:
      //Constructor
      Game();  //Load game, Introduction, sets random seed, creates library

      //Destructor
      ~Game(); //closes file streams, appends to leaderboard, save game
```

```
        //Mutators
        void setName(string s)        //Sets a player's name
        {user.name=s;}
        void setScore(unsigned int n) //Sets a player's score
        {user.score=n;}
        void setMoney(int n)          //Sets a player's money
        {user.money=n;}

        //Accessors
        string getName(){return user.name;}
        unsigned int getScore(){return user.score;}
        int getMoney(){return user.money;}

        //Member Functions
        void fill();          //Creates an index to the library
        void menu();          //Displays the menu
        void lderBrd();       //Displays a leaderboard
        void write();         //Appends to the library
        void read();          //Displays the entire library
        void addLder();       //Adds profile to leaderboard
        bool isGood(char[]);  //Input verification
        void play();          //Play the game

        //Add Functions
        void addMoney(int n)
        {user.money+=n;}
        void addScore(unsigned int n)
        {user.score+=n;}

        //Subtract Functions
        void subMoney(int n)
        {user.money-=n;}

        //Play class can access private members of Game class
        friend class Play;
};

#endif /* GAME_H */
/* File:   Player.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Struct Specification File for Player
 */

#ifndef PLAYER_H
#define PLAYER_H

//System Libraries
#include <iostream>
#include <string>
using namespace std; //Namespace of the System Libraries

//User Libraries

struct Player{
```

```
    string name;
    int money;
    unsigned int score;

    Player(){
        money=50; //Player starts with $500.00
        score=0;  //Player starts with 0 points
    }

    friend bool operator> (const Player &left, const Player &right)
    {return left.score>right.score;}
};

struct name_sort{
    bool operator()(const Player &left, const Player &right)
    {return left.name<right.name;}
};
#endif /* PLAYER_H */
/*
 * File:   main.cpp
 * Author: Javier Borja
 * Created on October 20, 12:00 PM
 * Purpose: Wheel of fortune. Player guesses a phrase with category as a clue.
 */

//System Libraries
#include <iostream>   //Input/Output
using namespace std;

//User Libraries
#include "Game.h"
#include "Play.h"

//Global Constants

//Function Prototypes

//Execution

int main(int argc, char** argv){
    //Variables
    Game game;       //Wheel of fortune Game object
    char choice;     //Menu choice

    //Input Data
    do{
        game.menu();
        cin>>choice;
        cin.ignore();
        cout<<"\n\n\n\n\n";

    //Process Data
        switch(choice){
            case'1':{
                game.play();
                break;
```

```
            }
            case'2':{
               game.lderBrd();
               break;
            }
            case'3':{
               game.write();
               break;
            }
            case'4':{
               game.read();
               break;
            }
         }
      }while((choice=='1'||choice=='2'||
            choice=='3'||choice=='4'));

      //Process Data

      return 0;
}
/* File:   Clue.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Class Specification File for Clue class
 */

#ifndef CLUE_H
#define CLUE_H

//System Libraries
#include <string>    //Strings
#include <iostream>  //Input/Output
#include <fstream>   //File input/Output
#include <cstring>   //Cstrings for strlen() function
#include <map>       //Maps
using namespace std; //Namespace of the System Libraries

//User Libraries

class Clue{
   private:
      map<int, string> catg;//Map of categories
      int size;
      unsigned int categry; //Number to represent a category
      char phrase[44];      //Max Phrase length
   public:
      Clue(); //Initialize the map

      //Mutators
      void setCat(unsigned int);
      void setPhrase(string);

      //Accessors
      char getPhrase(int i)
      {return phrase[i];}
```

```
        string getPhrase()
        {return phrase;}
        int getSize()
        {return strlen(phrase);}
        unsigned int getCat()
        {return categry;}

        //Output
        void showCat()
        {cout<<catg[categry]<<endl;}

        //Operator overload
        friend bool operator< (const Clue &left,const Clue &right){
            string a=left.phrase,b=right.phrase;
            return a<b;
        }
};

#endif /* CLUE_H */
/* File:   Game.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Class Implementation File for Game class
 */

//User Libraries
#include "Game.h"
#include "Play.h"

Game::Game(){
    //Variables
    int n;          //To hold score and money
    char s[SIZE];   //String to hold phrase
    //Initialize random seed.
    srand(static_cast<unsigned int>(time(0)));

    //Fill Library
    fill();

    //Try to load
    in.open("save.dat",ios::in);
    try{
        if(in.fail()){
            cout<<"No save detected"<<endl;
            throw 0;
        }else{
            if(in>>n){
                cout<<"Save file detected: would you like to continue?"<<endl
                    <<"(Both options will delete the profile, you can save later)\n"
                    <<"1.Continue\n2.New Game(default)"<<endl;
                cin>>s[0];
                cin.ignore();
                if(s[0]=='1'){
                    in.getline(s,SIZE,'.');
                    user.name=s;
                    user.money=n;
```

```
                in>>user.score;
            }else throw 0;

        }else{
            cout<<"No save detected"<<endl;
            throw 0;
        }
    }
  }
  catch(const int &){
    cout<<"Input your name: ";
    getline(cin,user.name);
  }
  cout<<"Welcome to Wheel of Fortune "<<user.name<<"!\n";

  //Close istream
  in.close();
  in.clear();

  //Clear save
  ofstream out;
  out.open("save.dat",ios::out | ios::trunc);
  out.close();
}

Game::~Game(){
  //Variables
  ofstream out; //Output

  //Output Data
  char choice;
  cout<<"Thanks for playing "<<user.name<<"!"<<endl;
  cout<<"Your final score: "<<user.score<<" points"<<endl;
  if(user.money>0){
    cout<<"Do you wish to save?\n1.Save\n2.Exit without saving(default)\n";
    cin>>choice;
    cin.ignore();
  }
  if(choice!='1'||user.money<=0){
    cout<<"\nDo you wish to add your score to the leaderboard?\n"
        "Input 1 to add\n"
        "Input 2 to exit(default): ";
    cin>>choice;
    if(choice=='1') addLder(); //Add to leaderboard
  }else{
    if(user.name.size()==0){
      cout<<"Error: No name"<<endl;
      return;
    }
    out.open("save.dat",ios::out);
    out<<user.money<<user.name<<"."<<user.score;
    out.close();
    cout<<"Your file has been saved"<<endl;
  }
}
```

```
void Game::addLder(){
   if(user.name.size()==0){
      cout<<"Error: No name"<<endl;
      return;
   }
   //Variables
   ofstream out; //Output
   int n;       //Size of string

   //Output Data
   out.open("users.dat",ios::out|ios::app);
   out<<user.name.size()<<user.name<<user.score<<endl;
   cout<<"Your score has been added"<<endl;

   //Close files
   out.close();
}

void Game::fill(){
   //Variables
   vector<Clue> arr; //Vector that contains clues and category
   unsigned int a;   //Temp char
   Clue temp;        //Temp clue
   char s[SIZE];     //Temp char array

   //Open File
   in.open("phrase.dat",ios::in);
   if(in.fail()){
      cout<<"CRITICAL ERROR: File opening failed"<<endl;
      exit(1);
   }

   //Input Data
   while(in>>a){
      in.getline(s,SIZE,'.');
      temp.setCat(a);
      temp.setPhrase(s);
      arr.push_back(temp);
   }

   //Process Data
   random_shuffle(arr.begin(),arr.end());
   vector<Clue>::iterator p;
   for(p=arr.begin();p!=arr.end();p++){
      this->stck.push(*p);
   }

   //Close Files
   in.close();
}

void Game::lderBrd(){
   //Variables
   fstream in;            //Input from file
   int n;                 //Size of string that is read from file
   set<Player,greater<Player>> arr;//Set of Player structures
```

```
    Player temp;            //Temp Player for input
    string a;               //Player inputs to continue
    in.clear();
    try{
        //Open files
        in.open("users.dat",ios::in);
        if(in.fail()){
            throw "users.dat not found";
        }
        //Input Data
        while(in>>n){ //Get size of string
            temp.name.resize(n);     //Resize string size to n
            in.read(&temp.name[0],n);//In name string of size n
            in>>temp.score;
            arr.insert(temp);
        }

        cout<<"Input sort method:\n1.By score(default)\n2.By name\n";
        cin>>n;
        cin.ignore();
        //Output Data
        if(n==2){
            vector<Player> a(arr.begin(),arr.end());
            sort(a.begin(),a.end(),name_sort());
            cout<<"Sorted Leaderboard by name:"<<endl;
            vector<Player>::iterator p;
            for(p=a.begin();p!=a.end();p++){
                cout<<p->name;
                cout<<setw(5)<<right<<p->score<<" points"<<endl<<endl;
            }
        }else{
            cout<<"Sorted Leaderboard by score:"<<endl;
            set<Player>::iterator p;
            for(p=arr.begin();p!=arr.end();p++){
                cout<<p->name;
                cout<<setw(5)<<right<<p->score<<" points"<<endl<<endl;
            }
        }
        cout<<"Press enter to continue"<<endl;
        getline(cin,a);
    }
    catch(char* const s){
        in.close();
        cout<<s<<endl;
    }

    //Close files
    in.close();
}

void Game::read(){
    //Variables
    Clue clue;      //Temporary Clue to fill
    unsigned int n; //Categories are numbered
    char s[SIZE];   //String to hold phrase
    char choice;    //Choice variable
```

```
queue<Clue> que;//Queue of clues

//Open File
in.clear();
in.open("phrase.dat",ios::in);
if(in.fail()){
   cout<<"CRITICAL ERROR: File opening failed"<<endl;
   return;
}
cout<<"Choose display option:\n1.Unsorted(default)\n2.Sorted\n";
cin>>choice;
cin.ignore();

//Output Data
if(choice=='2'){
   set<Clue>::iterator p;
   for(int i=0;i<7;i++){
      set<Clue> tset;
      in.clear();
      in.seekg(0,ios::beg); //Go back to beginning
      while(in>>n){        //Repeat until in can't extract a char
         in.getline(s,SIZE,'.');
         if(n==i+1){
            clue.setCat(n);
            clue.setPhrase(s);
            tset.insert(clue);
         }
      }
      for(p=tset.begin();p!=tset.end();p++){
         que.push(*p);
      }
   }
   int a=1,b=1; //Variables for algorthm
   while(!que.empty()){
      clue=que.front();
      que.pop();
      if(clue.getCat()==a){
         b=clue.getCat();
      }
      if(a==b){ //Algorithm for showing category once
         cout<<endl;
         clue.showCat();
         a++;
      }
      cout<<clue.getPhrase()<<endl;
   }
}else{
   while(in>>n){       //Repeat until in can't extract a char
      in.getline(s,SIZE,'.');
      clue.setCat(n); //Set category
      clue.showCat(); //View category
      cout<<s<<endl;  //Output string
   }
}

//Input Data
```

```
    in.close();
    cout<<endl<<"Input anything to continue: ";
    cin.get();
}

void Game::write(){
    //Variables
    char choice;    //Menu choice
    char input;     //Input for sub-menu
    fstream out;    //Output to file
    char line[SIZE];//Character array of size=44
    Clue clue;

    //Open File
    out.open("phrase.dat",ios::app);

    //Input Data
    cout<<endl<<"Input 1 to input a phrase\n"
          "Input 0 to exit: ";
    cin>>choice;
    cin.ignore();
    if(choice=='1'){
       cout<<endl<<"Input a category:\n";
       for(int i=1;i<=7;i++){
          cout<<i<<" ";
          clue.setCat(i);
          clue.showCat();
       }
       cout<<endl<<"0 Exit(default)"<<endl;
       cin>>input;
       cin.ignore();

    //Output Data
       if(input>48&&input<56){ //If input is '1'-'7'
          clue.setCat(input-48);
          cout<<"Input your phrase(max 44 characters): "<<endl;
          cin.getline(line,SIZE);
          if(isGood(line)){ //If input is good ask if wish to append
             cin>>choice;
             cin.ignore();
             if(choice=='1'){
                out<<input;
                for(int i=0;i<strlen(line);i++){
                   out<<static_cast<char>(toupper(line[i])); //Make uppercase
                }
                out<<"."<<endl;
                cout<<"You must restart the game for effects to take effect"<<endl;
             }
          }
       }
    }

    //Close File
    out.close();
}
```

```
bool Game::isGood(char a[]){
   //Process Data
   try{
      if(strlen(a)<4||strlen(a)>44){ //If char array doesn't fit size limit
         throw "ERROR: Phrase must be greater than 3 characters and less than 44";
      }
      for(int i=0;i<strlen(a);i++){
         if(isdigit(a[i])||(!isalpha(a[i])&&!isspace(a[i]))){//If not space or letter
            throw "ERROR: Input must be characters only\n";
         }
      }

   //Output Data
      cout<<"Do you really wish to add the following phrase?"<<endl;
      for(int i=0;i<strlen(a);i++){
         cout<<static_cast<char>(toupper(a[i]));
      }
      cout<<endl<<endl<<"Input 1 to append\n"
            "Or anything else to cancel: ";
      return true;
   }

   //Catch errors
   catch(char const* s){
      cout<<s<<endl;
      return false;
   }
}

void Game::menu(){
   //Output Data
   cout<<"\n\nYour money: $"<<user.money*10<<".00\n"
      "Your score: "<<user.score<<" points\n\n"
      "Select an option below:\n"
      " 1. Begin a new game of Wheel of Fortune\n"
      " 2. View the leaderboard\n"
      " 3. Append to the Library\n"
      " 4. View the Library(You'll spoil all the answers!)\n\n";
   if(user.money>0) cout<<"Any other input to exit and save your progress: ";
   else cout<<"Any other input to exit: ";
}

void Game::play(){
   if(user.money<0){
      cout<<"You have no money. Restart to play again."<<endl;
      return;
   }
   //Variables
   Play obj;       //Play object
   char option;    //Menu option
   obj.play(this); //Start playing

   //Input Data
   do{
      obj.display(); //Display hidden phrase and available keyboard letters
      do{
```

```
            obj.menu(this); //Display menu
            cin>>option;
            cin.ignore();
            switch(option){
               case'1':
                  obj.spin(this);
                  break;
               case'2':
                  obj.buy(this);
                  break;
               case'3':
                  obj.guess(this);
                  break;
               default: cout<<"ERROR: Bad Input"<<endl;
            }
         }while(option<49||option>51);
      //Loop until win or lose
      }while((obj.getWin()==false)&&(obj.getMoney(this)>0));
}
/* File:   Play.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Class Implementation File for play class
 */

//User Libraries
#include "Play.h"

void Play::play(Game *a){
   //Variables
   win=false;
   unsigned int c; //Temp char
   char   s[SIZE]; //Temp string

   //Input Data
   Clue temp;
   temp=a->stck.top();
   a->stck.pop();
   this->clue.setCat(temp.getCat());
   this->clue.setPhrase(temp.getPhrase());

   //Create a new Phrase
   Phrase p;
   p.setArr(temp.getPhrase());

   //Copy Phrase to pointer
   this->p=p;
}

void Play::end(Game *a){
   //Output Data
   if(a->getMoney()<=0){
      cout<<"The phrase was actually: "<<endl;
      cout<<clue.getPhrase()<<endl;
      cout<<"You have no money.\n"
         "You must restart the game to play again"<<endl;
```

```
    }else cout<<"Congrats you win!\n"
          "You have $"<<a->getMoney()*10<<".00 left in your account"<<endl;
}

void Play::spin(Game *a){
    //Variables
    int choice=rand()%WHEEL;//Random wheel choice
    char input;             //Letter input
    bool error;             //Incorrect letter input
    bool match=false;       //Did letter match?
    int money=w[choice];    //Money to add or subtract from user's money
    int points=0;           //Counter for points
    bool win=true;

    //Input Data
    cout<<"Spinning...\nPress Enter to continue";
    cin.get();
    cout<<"_____"<<endl;
    if(money==0) cout<<"You spun a free guess"<<endl;
    else cout<<endl<<"You spun $"<<money*10<<".00"<<endl;
    display();
    do{
        try{
            error=false;
            cout<<"What letter do you want to use? ";
            cin>>input;
            cin.ignore();

    //Process Data
            if(!isalpha(input)){
                throw "Input must be part of the alphabet";
            }
            input=static_cast<char>(toupper(input)); //Make uppercase
            if(input=='A'||input=='E'||input=='I'||input=='O'||input=='U'){
                throw "You have to buy vowels";
            }
            for(int i=0;i<ALPHA;i++){
                if(k.getChar(i)==input){
                    if(k.isUsed(i)==true){
                        cout<<"You already used that letter"<<endl;
                        return;
                    }else k.use(i);
                }
            }
        }
        catch(char const* s){
            cout<<s<<endl;
            error=true;
            cout<<"Press enter to continue"<<endl;
            cin.get();
        }
    }while(error); //Keep looping until valid input
    for(int i=0;i<p.getSize();i++){
        if(input==p.getLetter(i)){  //If letter matches
            points+=10;             //Add ten points
            match=true;             //Match is true
```

```
            p.use(i);               //Don't hide letter anymore
        }
    }
    //Output Data
    if(match){ //If match is true
        cout<<"You have been awarded $"<<money*10<<".00"<<endl;
        a->addMoney(money);
        cout<<"You gain 10 points for each letter guessed"<<endl;
        cout<<"You gained "<<points<<" points"<<endl<<endl;
        a->addScore(points);
        for(int i=0;i<p.getSize();i++){
            if(p.getUsed(i)==false){
                win=false;   //Not all letters are revealed, win=false;
            }
        }
        this->win=win;       //All letters of phrase are revealed, win=true
    }else{ //Match is not true
        a->subMoney(money);
        cout<<"_____"<<endl;
        cout<<"You have lost $"<<money*10<<".00."<<endl<<endl;
    }if(a->getMoney()<=0){
        end(a);
    }
    if(this->win==true){
        end(a);
    }
}

void Play::buy(Game *a){
    //Conditions to return
    if((k.isUsed(0))&&(k.isUsed(4))&&(k.isUsed(8))&&(k.isUsed(14))&&(k.isUsed(20))){
        cout<<"You have already bought all the vowels"<<endl;
        return; //Exit
    }
    if(a->getMoney()<=50){
        cout<<"You don't have enough money!"<<endl;
        cout<<"Spin the wheel or guess the puzzle"<<endl;
        cout<<"Input a key to continue: ";
        cin.get();
        return; //Exit
    }

    //Variables
    char input;     //Input for vowel
    bool error;     //Error
    bool win=true;  //Win

    //Input Data
    do{
        try{
            error=false;
            cout<<"_____"<<endl;
            display();
            cout<<"Which vowel do you want to buy? ";
            cin>>input;
            cin.ignore();
```

```
            input=static_cast<char>(toupper(input));
            if(input=='A'||input=='E'||input=='I'||input=='O'||input=='U'){

            }
            else{
               throw "You did not choose a vowel";
            }
            for(int i=0;i<ALPHA;i++){
               if(k.getChar(i)==input){
                  if(k.isUsed(i)==true){
                     throw "You already used that letter";
                  }else k.use(i);
               }
            }
         }
         catch(char const* s){
            cout<<s<<endl;
            error=true;
            cout<<"Press enter to continue"<<endl;
            cin.get();
         }
      }while(error==true); //Loop until valid input

      //Process Data
      cout<<"You have bought a vowel for $500.00"<<endl;
      a->subMoney(50);              //Subtract money from user
      for(int i=0;i<p.getSize();i++){
         if(p.getLetter(i)==input) //Reveal vowels from clue phrase
            p.use(i);
      }
      for(int i=0;i<p.getSize();i++){
         if(p.getUsed(i)==false){
            win=false;//Not all letters are revealed, win=false;
         }
      }
      if(win==true){    //All letters of phrase are revealed,
         this->win=win;//win=true
         end(a);
      }
   }

   void Play::guess(Game *a){
      //Variables
      string answer; //Player answer
      int counter=0; //Amount of empty letters in keyboard array
      int score=30;  //Points=score*counter
      bool win=true;

      //Input Data
      display();
      cout<<"Input the final answer: ";
      getline(cin,answer);

      //Process Data
      for(int i=0;i<p.getSize();i++){ //Convert to uppercase
         answer[i]=static_cast<char>(toupper(answer[i]));
```

```
    }
    for(int i=0;i<p.getSize();i++){
        if((p.getLetter(i))!=(answer[i])){//Check to see if all letters match
            win=false;                  //Phrase did not match answer
        }
    }
    cout<<endl;
    for(int i=0;i<p.getSize();i++){    //Go through phrase array to add
        if((p.getUsed(i))==false){     //points for each letter that is not used
            counter++;
        }
    }

    //Output Data
    if(win==true){
        score*=counter;
        cout<<"You gain 30 points for each hidden letter you guessed"<<endl;
        cout<<"You gain "<<score<<" points"<<endl;
        a->addScore(score);
        this->win=win;              //Make private member win=local win;
        end(a);                     //Go to end
    }else{
        cout<<"You did not guess correctly. You have lost $300.00\n";
        a->subMoney(30);
    }
    if(a->getMoney()<=0){
        end(a);
    }
}

void Play::display(){
    //Output Data
    clue.showCat();
    p.display();
    k.display();
    cout<<endl;
}

void Play::menu(Game *a){
    //Output Data
    cout<<"Your money = $"<<a->getMoney()*10<<".00"<<endl;
    cout<<endl<<endl<<"What would you like to do?"<<endl;
    cout<<  " 1. Spin the Wheel ✪\n"
    " 2. Buy a vowel ($500.00)\n"
    " 3. Solve the Puzzle ✉(Bad guess lose $300.00)\n"<<endl;
}
/* File:   Phrase.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Class Implementation File for Phrase class
 */

//User Libraries
#include "Phrase.h"
#include "Letter.h"
```

```
void Phrase::use(int i){
   p=arr.begin();
   advance(p,i);
   p->use();
}

void Phrase::setArr(string s){
   //Input Data
   size=s.length();
   p=arr.begin();
   for(int i=0;i<size;i++,p++){    //Initialize phrase array with clue
      arr.push_back(s[i]);
      if(isspace(p->getLetter())){//If letter is space
         p->use();               //Don't hide it
      }
   }
}

void Phrase::display(){
   //Output Data
   for(p=arr.begin();p!=arr.end();p++){         //Go through clue array
      if(p->isLtUsed()==false){  //If letter has not been used, hide letter
         cout<<"□";
      }else{
         p->display();
      }
   }
   cout<<endl;
}

char Phrase::getLetter(int i){
   p=arr.begin();
   advance(p,i);
   return p->getLetter();
}

bool Phrase::getUsed(int i){
   p=arr.begin();
   advance(p,i);
   return p->isLtUsed();
}
/* File:   Letter.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Class Specification File for Letter class
 */

//User Libraries
#include "Letter.h"

Letter::Letter(char a){
   //Process Data
   letter=a;
   isUsed=false;
}
```

```
Letter::Letter(){
   //Process Data
   letter=' ';
   isUsed=false;
}
/* File:   Keyboard.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Class Specification File for Keyboard class
 */

//User Libraries
#include "Keyboard.h"

Keyboard::Keyboard(){
   //Initializing the keyboard
   for(int i=0;i<ALPHA;i++){   //Initialize with alphabet
      arr.push_back('A'+i);
   }
}

void Keyboard::display(){
   //Output Data
   cout<<endl<<"Your keyboard:"<<endl;
   p=arr.begin();
   for(p=arr.begin();p!=arr.end();p++){//Go through keyboard list
      if(p->isLtUsed()==false){ //If letter has not been used, hide letter
         p->display();
      }else cout<<"■";
      if((distance(arr.begin(),p)+1)%13==0) cout<<endl;
   }
}

void Keyboard::use(int i){
   p=arr.begin();
   advance(p,i);
   p->use();
}

bool Keyboard::isUsed(int i){
   p=arr.begin();
   advance(p,i);
   p->isLtUsed();
}

char Keyboard::getChar(int i){
   p=arr.begin();
   advance(p,i);
   p->getLetter();
}
/* File:   Clue.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Class Implementation File for Clue class
 */
```

```
//User Libraries
#include "Clue.h"

Clue::Clue(){
   catg[1]="TV Show";
   catg[2]="Event";
   catg[3]="Movie";
   catg[4]="Landmark";
   catg[5]="Famous Person";
   catg[6]="Thing";
   catg[7]="Song Title";
}

void Clue::setCat(unsigned int n){
   categry=n;
}

void Clue::setPhrase(string s){
   size=s.length();
   //Input Data
   for(int i=0;i<s.length();i++){
      phrase[i]=s[i];
   }
   phrase[size]='\0';
}
/* File:   Phrase.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Class Specification File for Phrase class
 */

#ifndef PHRASE_H
#define PHRASE_H

//System Libraries
#include <iostream>  //Input/Output
#include <string>    //String Library
using namespace std; //Namespace of the System Libraries

//User Libraries
#include "Letter.h"

class Phrase: public Letter{
   private:
      list<Letter> arr;       //List
      list<Letter>::iterator p;//Iterator to traverse
      int size;    //Size of array
   public:
      //Mutators
      void use(int i);

      //Accessors
      int getSize(){return size;}
      char getLetter(int);
      bool getUsed(int);
```

```
        //Member Functions
        void setArr(string);
        void display() override;
};

#endif /* PHRASE_H */
/* File:   Letter.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Class Specification File for Letter class
 */

#ifndef LETTER_H
#define LETTER_H

//System Libraries
#include <iostream>  //Input/Output
#include <list>      //list
using namespace std; //Namespace of the System Libraries

//User Libraries

class Letter{
    protected:
        char letter;
        bool isUsed;

    public:
        //Constructors
        Letter(char);
        Letter();

        //Mutators
        void setChar(char a)
        {letter=a;}
        void use()
        {isUsed=true;}

        //Accessors
        char getLetter(){return letter;}
        bool isLtUsed(){return isUsed;}

        //Member functions
        virtual void display(){cout<<letter;}
};

#endif /* LETTER_H */
/* File:   Keyboard.h
 * Author: Javier B
 * Created on October 20, 12:00 PM
 * Purpose: Class Specification File for Keyboard class
 */

#ifndef KEYBOARD_H
#define KEYBOARD_H
```

```
//System Libraries
#include <iostream>  //Input/Output
using namespace std; //Namespace of the System Libraries

//User Libraries
#include "Letter.h"

//Constants
const int ALPHA=26; //Size of the alphabet

class Keyboard: public Letter{
   public:
      list<Letter> arr;       //List
      list<Letter>::iterator p;//Iterator to traverse
   public:
      //Constructor
      Keyboard();

      //Mutators
      void use(int);

      //Accessors
      bool isUsed(int);
      char getChar(int);

      //Member functions
      void display() override;
};

#endif /* KEYBOARD_H */
```