Project 1

<Liar Dice>

<Version 2.0>

Name: Haolan Ye (Benjamin)

Class: CSC-17A 43950

Date: 06/04/2015

Contents

1. Introduction(http://en.wikipedia.org/wiki/Liar's_dice):

Five dice are used per player with dice cups used for concealment. Each round, each player rolls a "hand" of dice under their cup and looks at their hand while keeping it concealed from the other players.

The first player begins bidding, announcing any face value and the number of dice that the player believes are showing that value, under all of the cups in the game. Ones are often wild, always counting as the face of the current bid. Each player has two choices during their turn: to make a higher bid, or challenge the previous bid - typically with a call of "liar." Raising the bid means either increasing the quantity, or the face value, or both.

If the current player challenges the previous bid, all dice are revealed. If the bid is valid (at least as many of the face value and any wild aces are showing as were bid), the bidder wins. Otherwise, the challenger wins.

That game I made was created based on the way I played in China. Because of difference between different regions, some rules of Liar Dice are different. In China, there are some addition rules (also in my game):

- From the beginning, ones are wild unless you bid 3 ones
- After bidding ones, ones cannot be wild anymore
- You could bid only 3 fives, which means you bid there are 3 fives but not including ones
- After bidding only 3 fives, ones cannot be wild anymore
- The number of face of first bid has to be greater than 1.5*players

2. Summary:

Total Line of Code	1000+
Comment Line	-
Variable	-
Function	-

This game contains most concepts that we have learned in the class. I used pointer with player (structure) and used structure to record the dices that each player has. In the structure of player, there is also a tag (integer) for the player. I will use the tag when someone wants to challenge. The game will write the data of players into binary file, and after someone challenge, it read the file to a new players array. Afterward, it will get the result by using the new players array.

3. Problems during coding

a) **Limit the player input with correct format**

When player doesn't challenge, he need to make a higher bid. Player needs to input a string for bidding. "4 5" means that player bids 4 fives. "4n5" means that player bids 4 fives only (ones cannot be wild at that time).

b) **Get the playing order for the players**

At the beginning of the game, it will randomly get the playing order for the players. In the rest of the game, players bid and challenge based on that order. I used a switch statement in a do-while statement to randomly access. It loops until someone challenges.

c) What should AI do?

There is no a specific algorithm for the AI in that game. I made the AI based on what I think when I play Liar Dice. There are lots of possibilities that happens when AI determine challenging or not.

- When AI doesn't have the dices that bided by previous players
- When AI only have one that bided by previous players

… etc.

When AI needs to bid higher, AI should sometimes lie and sometimes tell the truth. Therefore, I set the possibility that AI lie to 2/5. When AI tells the truth, he will bid based on what dices he has. When AI lies, he will randomly select one face of dice that does not exist in his dices.

d) One is wild

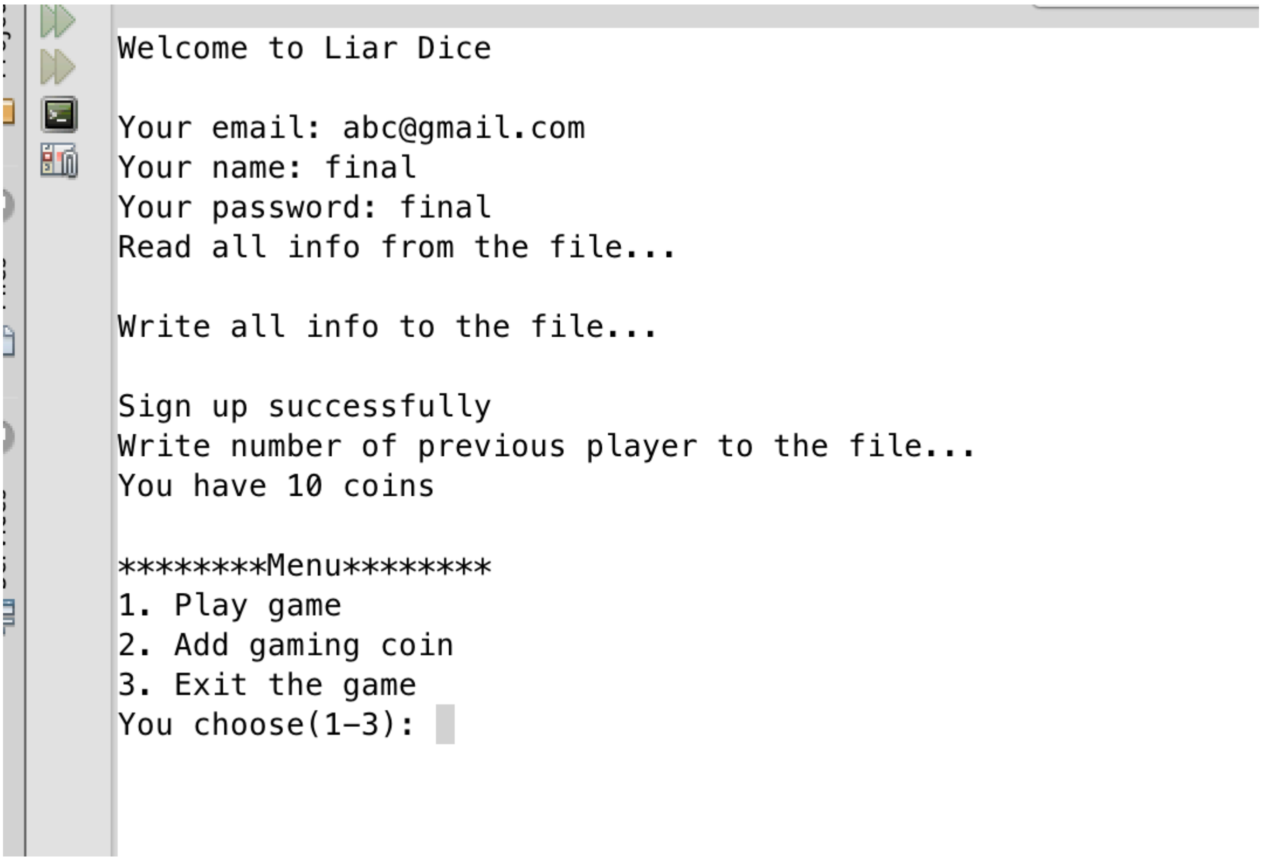
Mostly, ones are wild unless you bid "3 fives only" or "3 ones" (Both are example). Therefore, I need a Boolean to record one is wild or not. After one is not wild, the number of each dices doesn't count ones.

4.Pseudo Code

```
Set seed for random number
Sign in/sign up (input name, password, email)
Introduce the game
Display menu (play, add coins, or exit)
When Play, Prompt players for the number of players
Roll the dices for players
Initialize based on the number of player
Display player’s dices
Randomly choose a player be the first bidder
Begin biding until someone challenge {
  Someone bid first (based on random select)
  Other players determine challenge or not
  Bid in players order
}
Show dices of all players
Display the result of the game {
        Check the number of face bided is greater than the number of dices
  that players have exactly
}
update the information of players with binary file
When add coins, prompt user input the card number
Deallocate memory
```

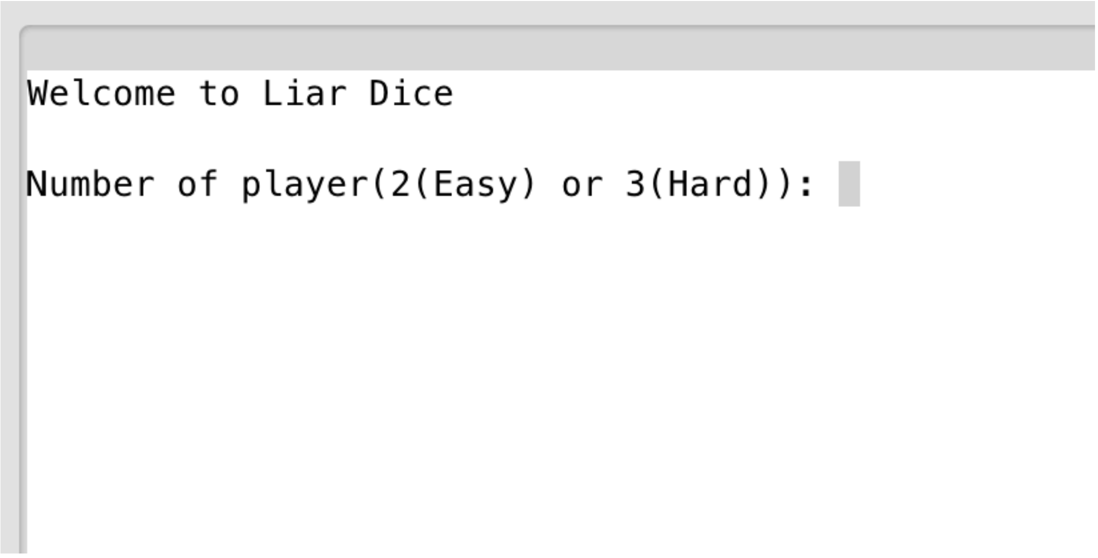
5. Screen Shot

1) Ask for number of player



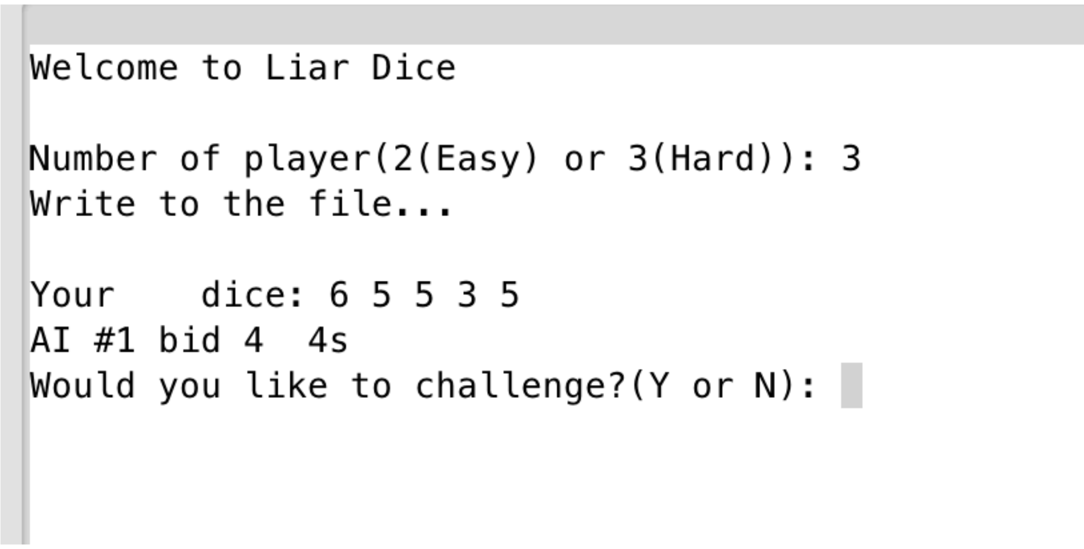
```
Welcome to Liar Dice

Your email: abc@gmail.com
Your name: final
Your password: final
Read all info from the file...

Write all info to the file...

Sign up successfully
Write number of previous player to the file...
You have 10 coins

********Menu********
1. Play game
2. Add gaming coin
3. Exit the game
You choose(1-3): 
```

2) Ask for number of player



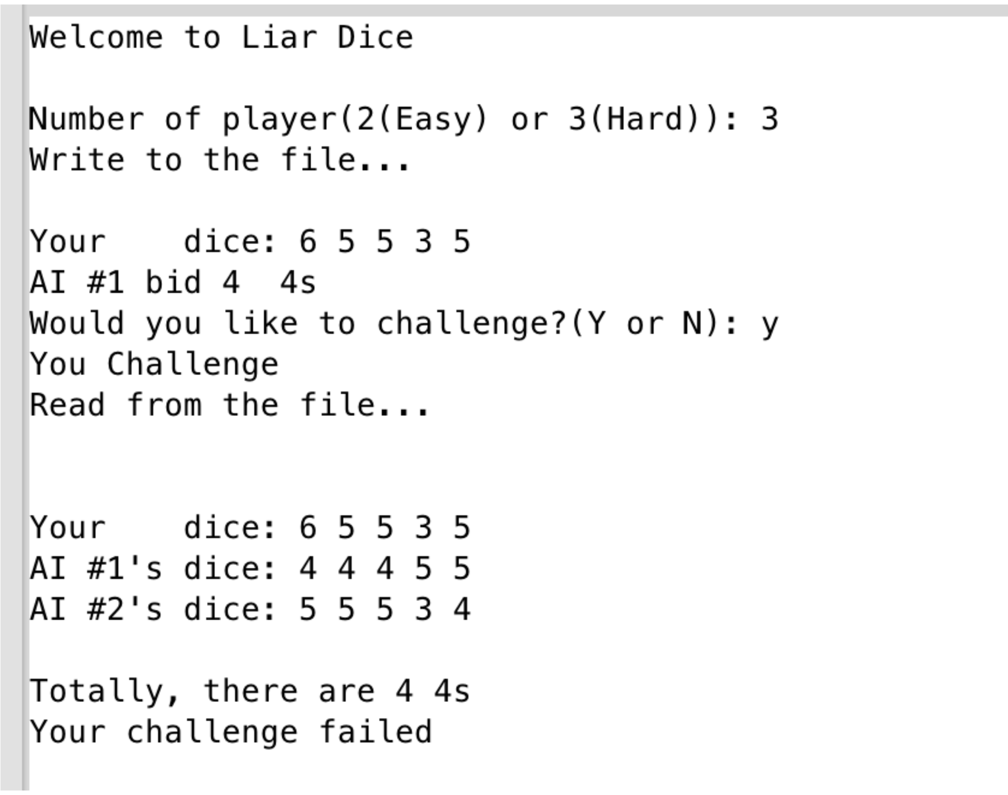
```
Welcome to Liar Dice

Number of player(2(Easy) or 3(Hard)): 
```

3) Randomly choose a player to be the first bid, then you can challenge



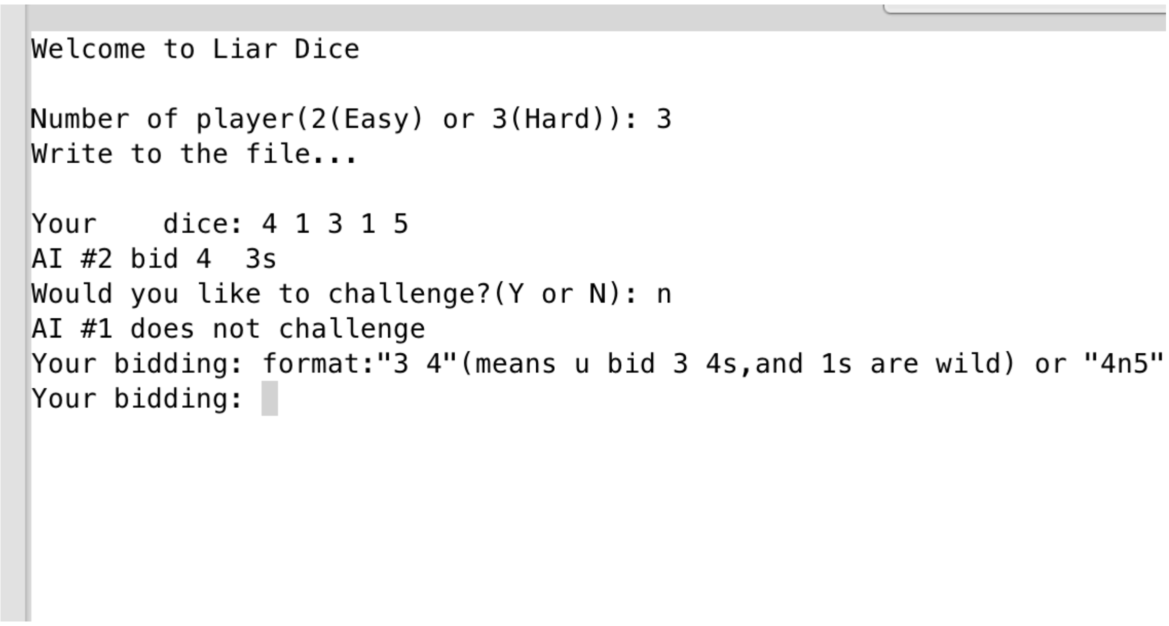
```
Welcome to Liar Dice

Number of player(2(Easy) or 3(Hard)): 3
Write to the file...

Your    dice: 6 5 5 3 5
AI #1 bid 4  4s
Would you like to challenge?(Y or N):
```

4) If challenge, the result will come up



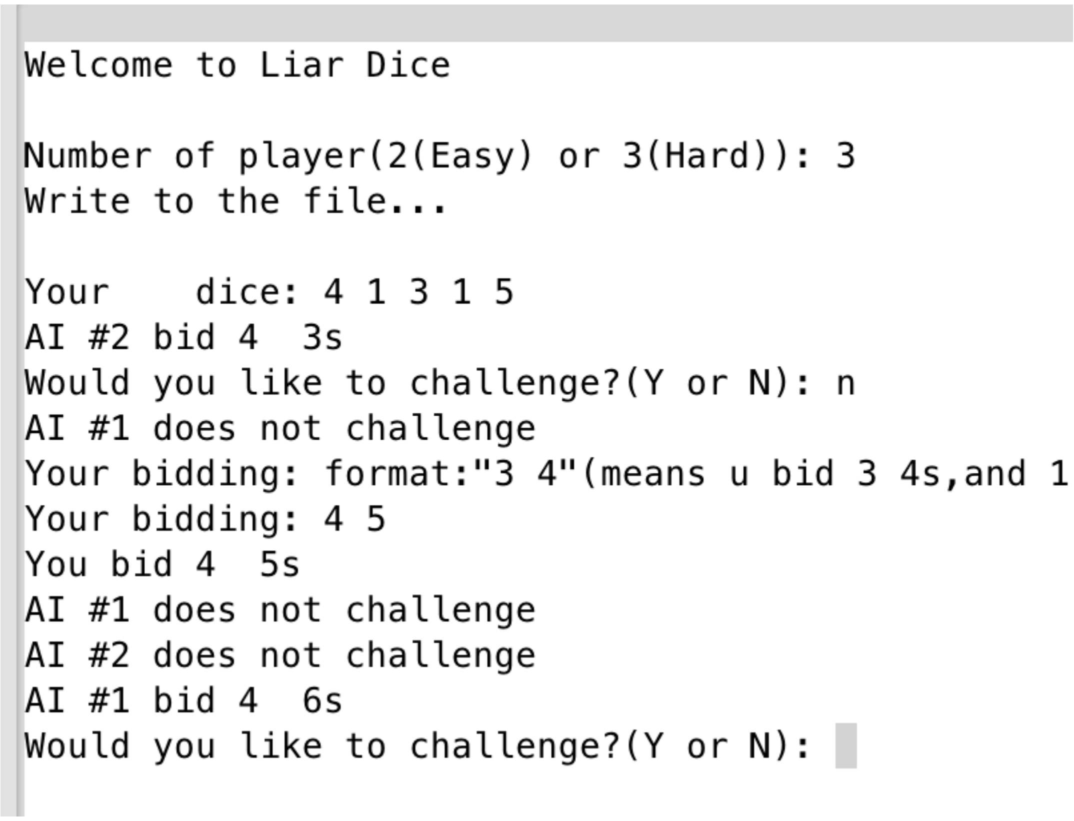
```
Welcome to Liar Dice

Number of player(2(Easy) or 3(Hard)): 3
Write to the file...

Your    dice: 6 5 5 3 5
AI #1 bid 4  4s
Would you like to challenge?(Y or N): y
You Challenge
Read from the file...


Your    dice: 6 5 5 3 5
AI #1's dice: 4 4 4 5 5
AI #2's dice: 5 5 5 3 4

Totally, there are 4 4s
Your challenge failed
```

5) If not challenge, your turn to bid



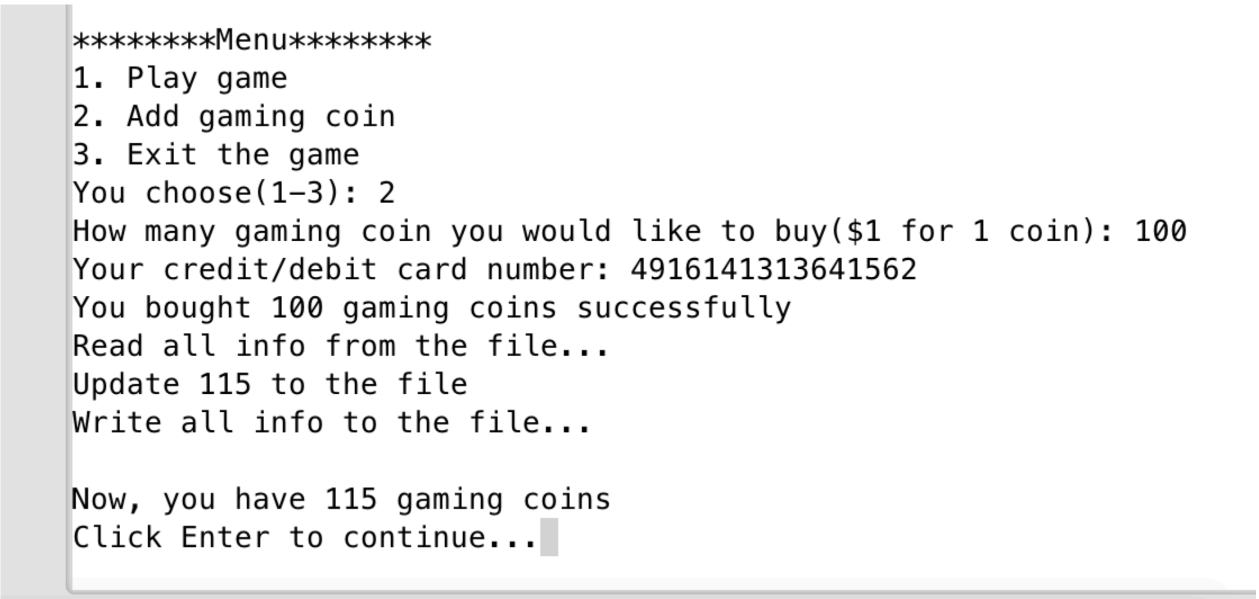
```
Welcome to Liar Dice

Number of player(2(Easy) or 3(Hard)): 3
Write to the file...

Your    dice: 4 1 3 1 5
AI #2 bid 4  3s
Would you like to challenge?(Y or N): n
AI #1 does not challenge
Your bidding: format:"3 4"(means u bid 3 4s,and 1s are wild) or "4n5"
Your bidding: 
```

6) After you bid, if AI(s) doesn't challenge, it's their turn to bid, and ask you challenge or not



```
Welcome to Liar Dice

Number of player(2(Easy) or 3(Hard)): 3
Write to the file...

Your    dice: 4 1 3 1 5
AI #2 bid 4  3s
Would you like to challenge?(Y or N): n
AI #1 does not challenge
Your bidding: format:"3 4"(means u bid 3 4s,and 1
Your bidding: 4 5
You bid 4  5s
AI #1 does not challenge
AI #2 does not challenge
AI #1 bid 4  6s
Would you like to challenge?(Y or N): 
```

7) Add gaming coins



```
********Menu********
1. Play game
2. Add gaming coin
3. Exit the game
You choose(1-3): 2
How many gaming coin you would like to buy($1 for 1 coin): 100
Your credit/debit card number: 4916141313641562
You bought 100 gaming coins successfully
Read all info from the file...
Update 115 to the file
Write all info to the file...

Now, you have 115 gaming coins
Click Enter to continue...
```

6. Libraries

a. System libraries

- ✓ **<iostream>**
- ✓ **<cstdlib>**
- ✓ **<ctime>**
- ✓ **<string>**
- ✓ **<vector>**
- ✓ **<fstream>**

б. System libraries

- ✓ **AI.h**
- ✓ **Player.h**

7. Concept covered

Concept	Type	Code	Location(line)
Pointer with structure	Info *	Info *infor=new Info[getNInf()];	259 in player.cpp
Type casting	static_cast<type >	static_cast<unsigned short>(time(0))	35 in main
Binary file	fstream output	fstream out;	274 in player.cpp
	fstream input	fstream in;	260 in player.cpp
string	string	string ans="N"	161
class	class	class Player	14 in player.h
getter	get	int getOrdr() const {return order;}	64 in player.h
setter	set	void setNInf(int);	33 in player.h
inline function		void setOrdr(int n) {order=n;};	51 player.h
Constructor		Player::Player()	29 player.cpp
Overload function		void bid()	25 in AI.h
abstract base class		virtual void bid()=0;	AbsPlayer.h

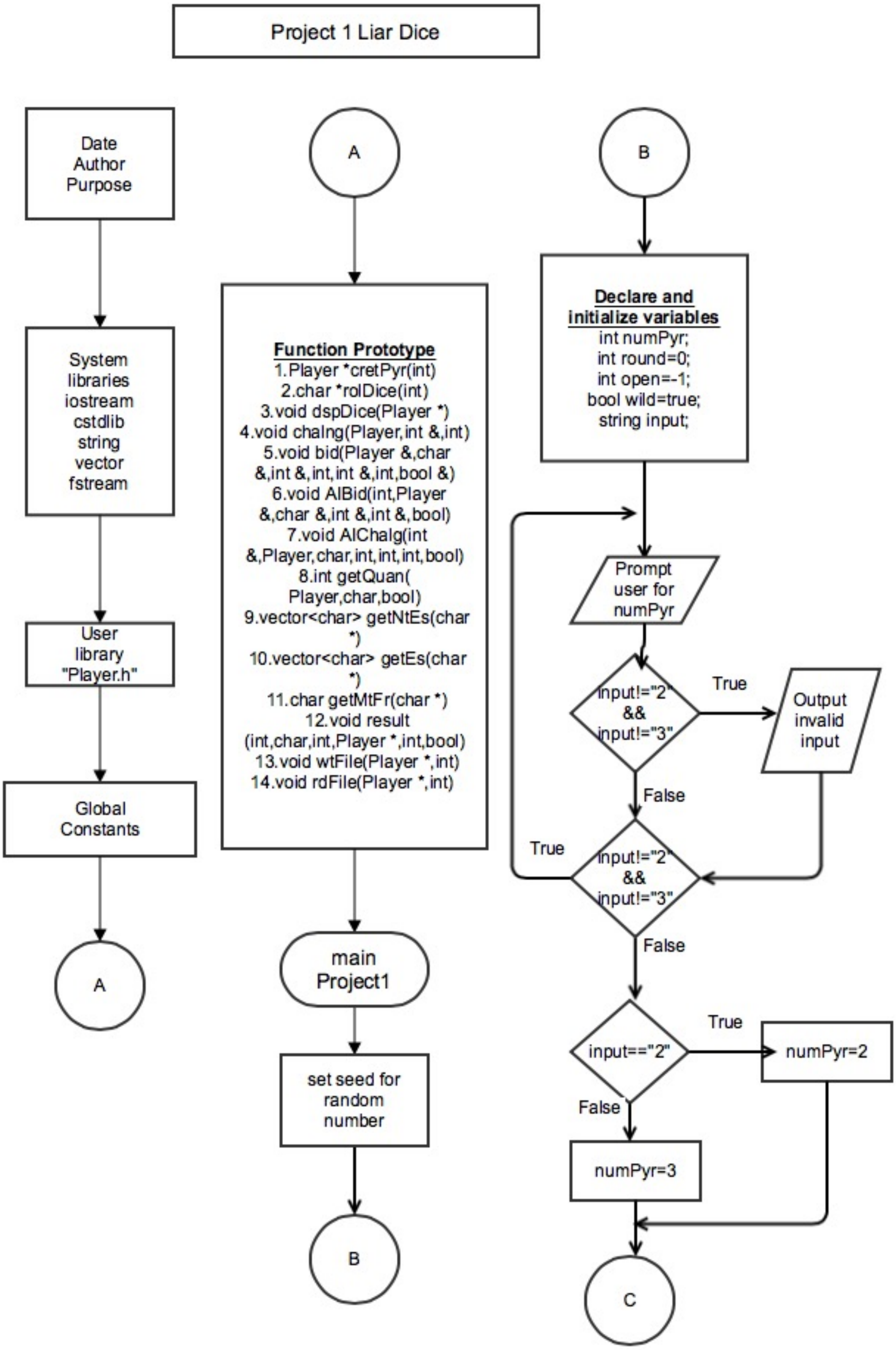
vector	vector<char >	vector<char> nExist	15 AI.h

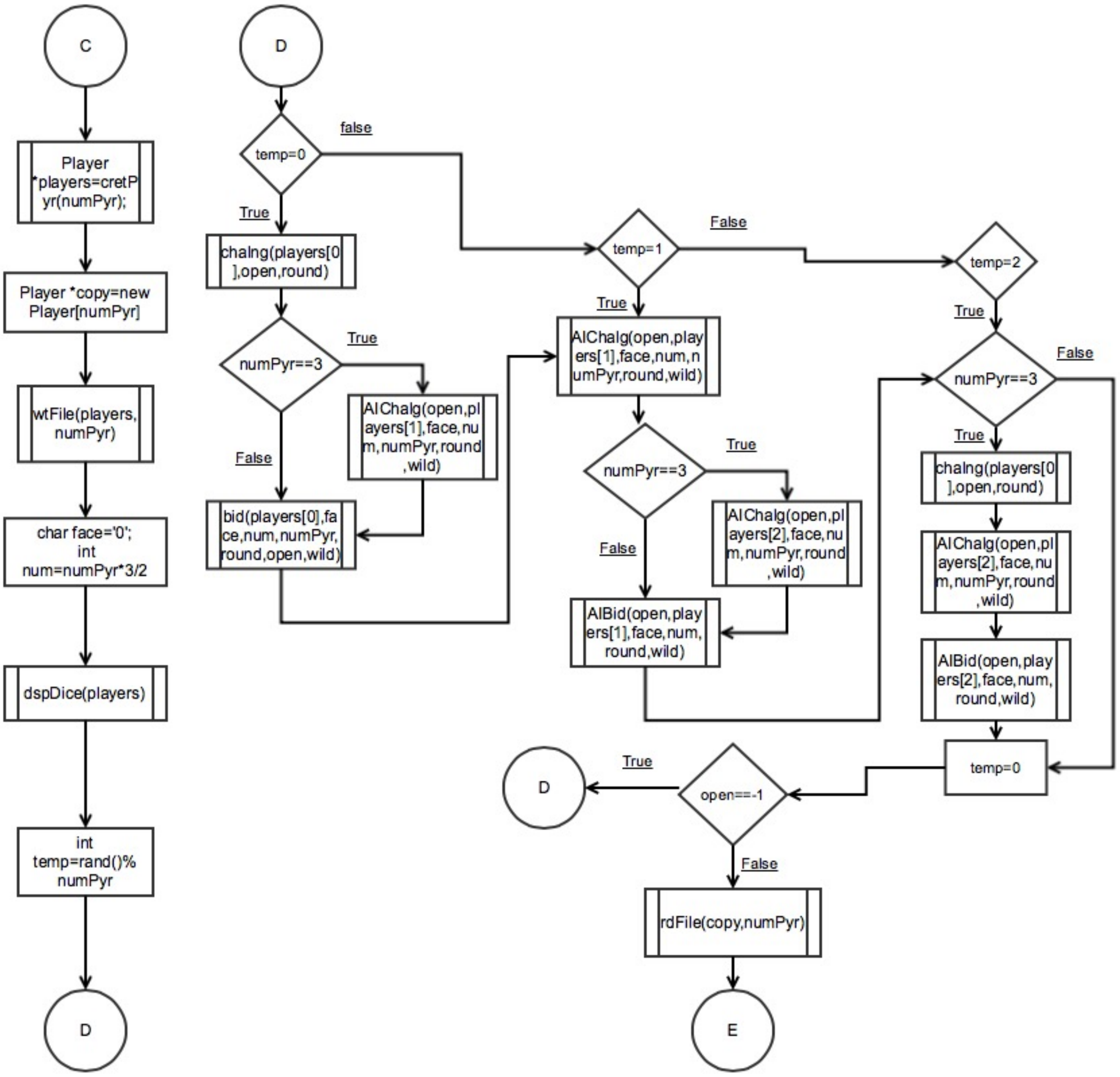
Sorting	Sorting	for(int i=0;i<5;i++) {
		for(int j=i+1;j<6;j++) {
		if(nExist[i]<nExist[j]) {
		char temp=nExist[i];
		nExist[i]=nExist[j];
		nExist[j]=temp;
		}
		}
		}
			332

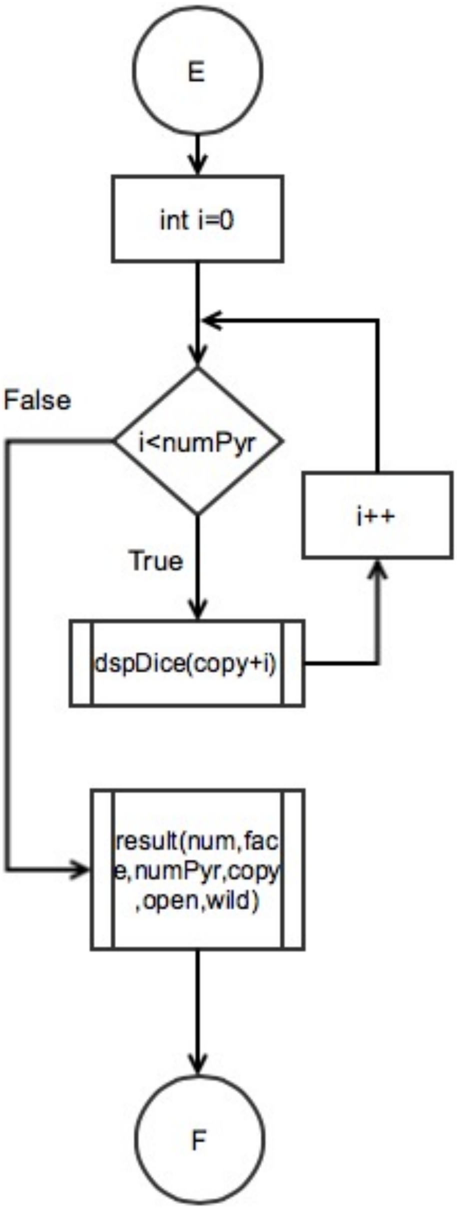
Array of Object		AI *a=new AI[np-1];	60 in main
Instance variables	static int	static int open	21 in Player.h
Static Member Functions		static void setNumC();	23 in Player.h
Operator Overloading		T &operator[](const int &);	32 in aVector.h
inheritance		class AI:public Player	12 in Player.cpp
Template class		template <class T> class aVector	16 in aVector.h

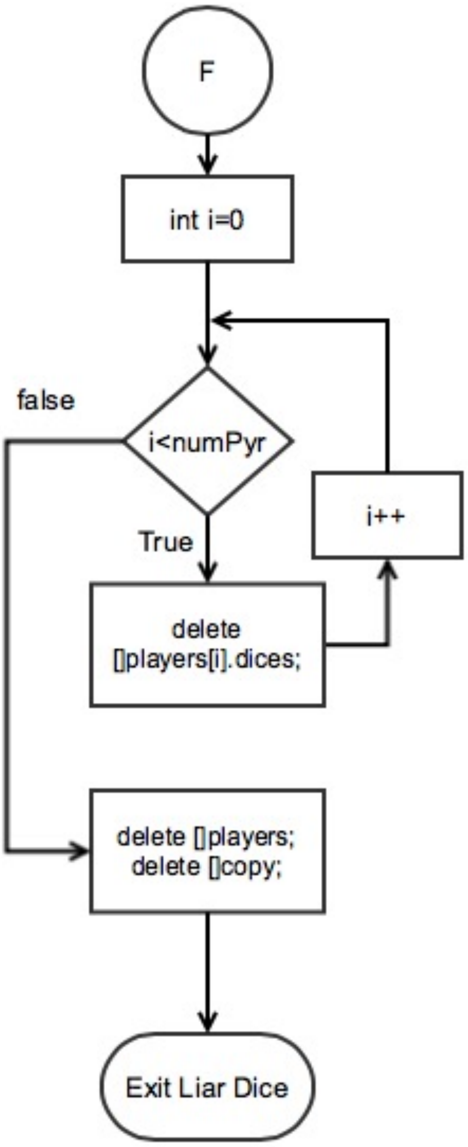
Exception		try {
		aptr = new T[usdSize];
		} catch (bad_alloc) {
		memError();
		}
			45 in aVector.h

8. Flowchart in Project 1 (1) Main flowchart (3 pages)

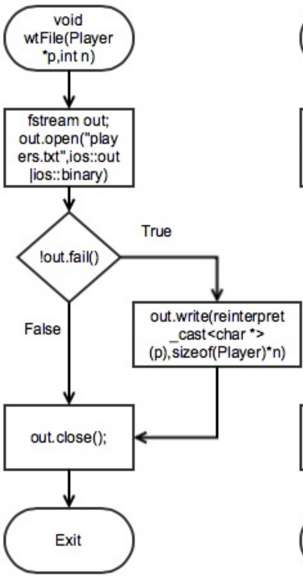



C
Player *players=cretPyr(numPyr);
Player *copy=new Player[numPyr]
wtFile(players, numPyr)
char face='0'; int num=numPyr*3/2
dspDice(players)
int temp=rand()% numPyr
D
D
temp=0
false
True
chalng(players[0],open,round)
numPyr==3
True
False
AIChalg(open,players[1],face,num,numPyr,round,wild)
bid(players[0],face,num,numPyr,round,open,wild)
temp=1
False
True
AIChalg(open,players[1],face,num,numPyr,round,wild)
numPyr==3
True
False
AIChalg(open,players[2],face,num,numPyr,round,wild)
AIBid(open,players[1],face,num,round,wild)
temp=2
True
numPyr==3
False
True
chalng(players[0],open,round)
AIChalg(open,players[2],face,num,numPyr,round,wild)
AIBid(open,players[2],face,num,round,wild)
temp=0
open==-1
True
D
False
rdFile(copy,numPyr)
E

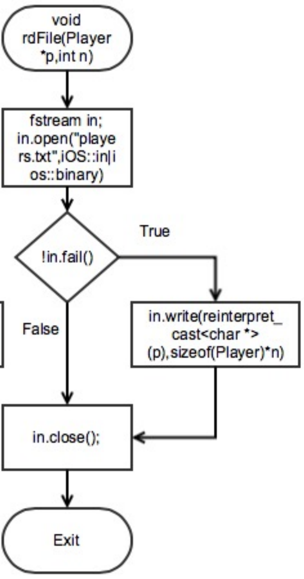

E
int i=0
False
i<numPyr
True
i++
dspDice(copy+i)
result(num,face,numPyr,copy,open,wild)
F


F
int i=0
false
i<numPyr
True
i++
delete []players[i].dices;
delete []players;
delete []copy;
Exit Liar Dice

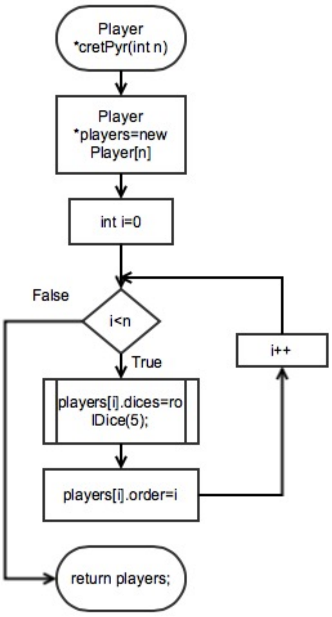
(2) Function flowchart (3 pages)

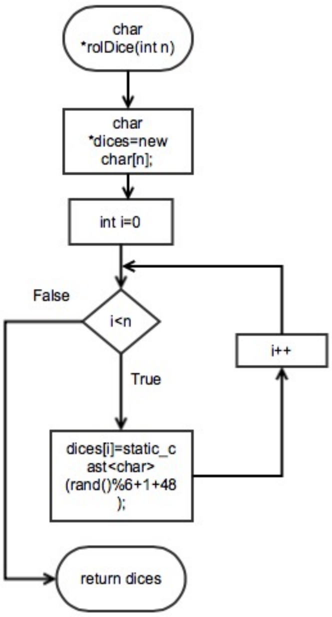


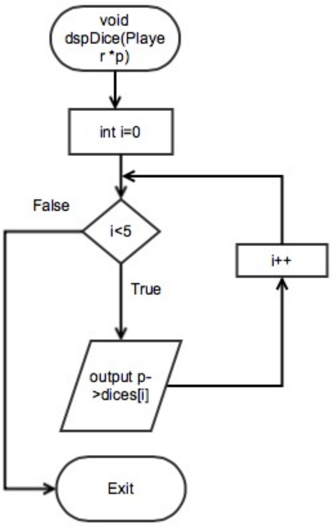
void wtFile(Player *p,int n)
fstream out; out.open("players.txt",ios::out |ios::binary)
!out.fail()
True
False
out.write(reinterpret_cast<char *>(p),sizeof(Player)*n)
out.close();
Exit

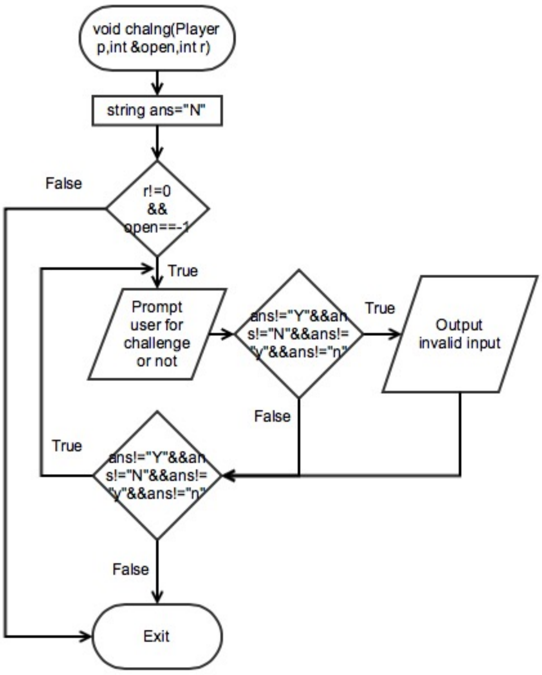


void rdFile(Player *p,int n)
fstream in; in.open("players.txt",iOS::in|ios::binary)
!in.fail()
True
False
in.write(reinterpret_cast<char *>(p),sizeof(Player)*n)
in.close();
Exit

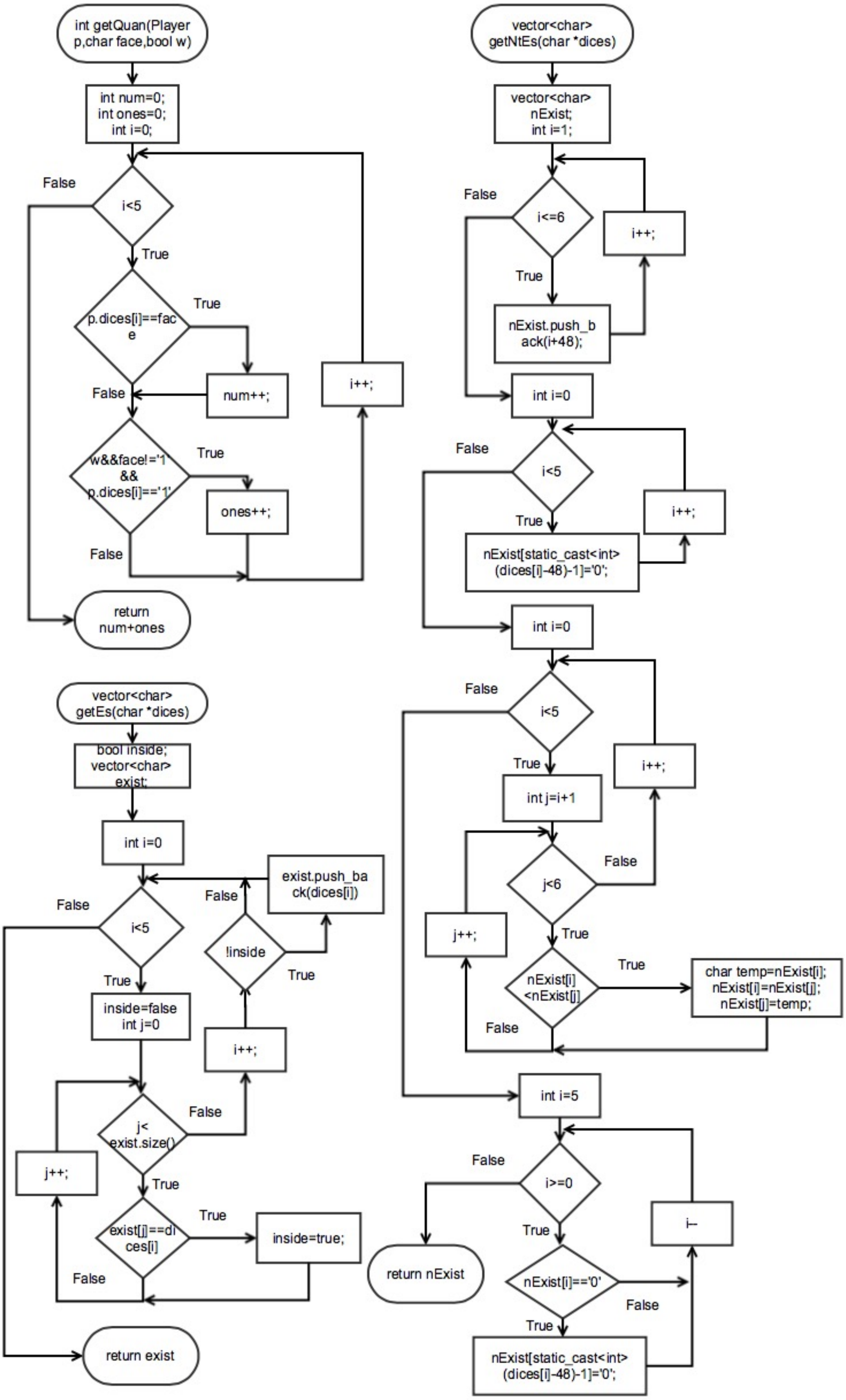


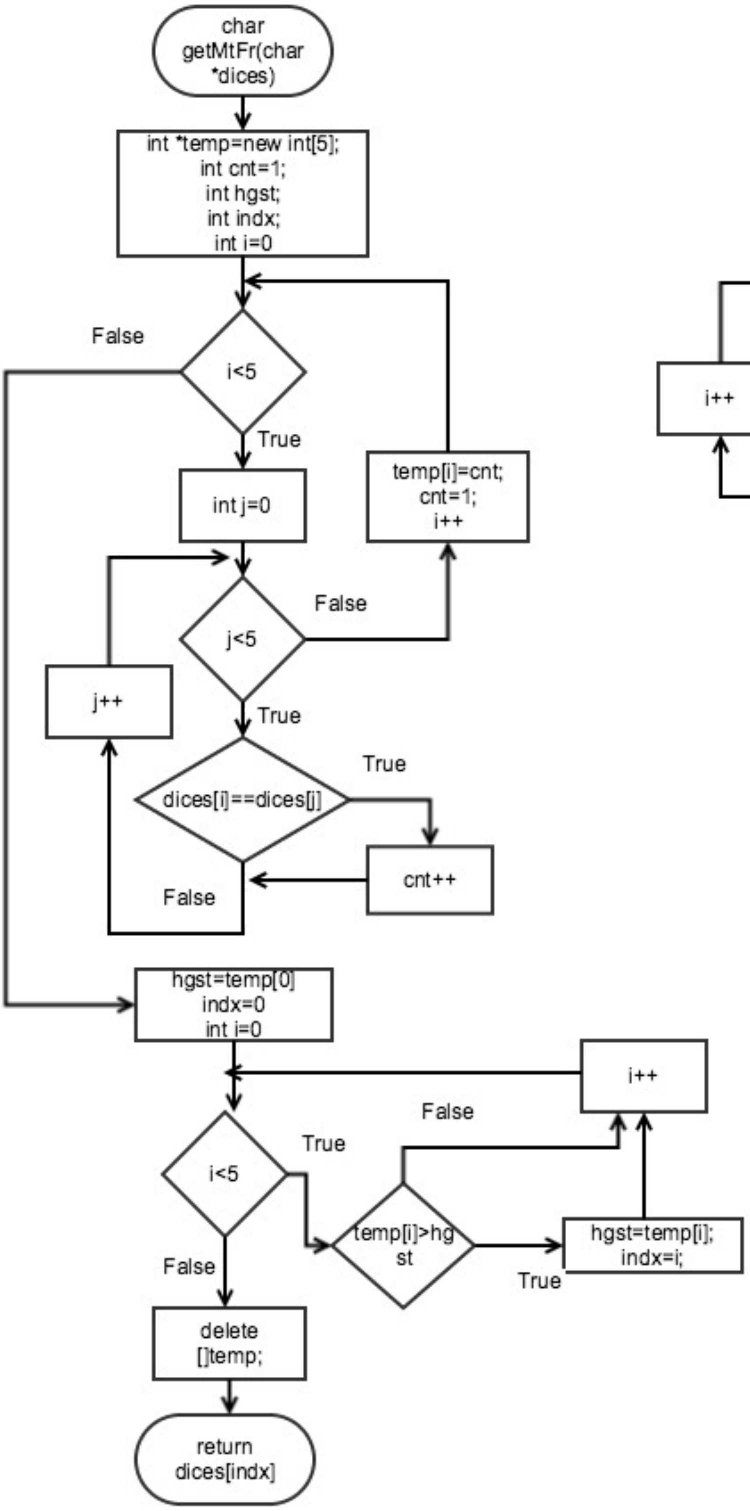


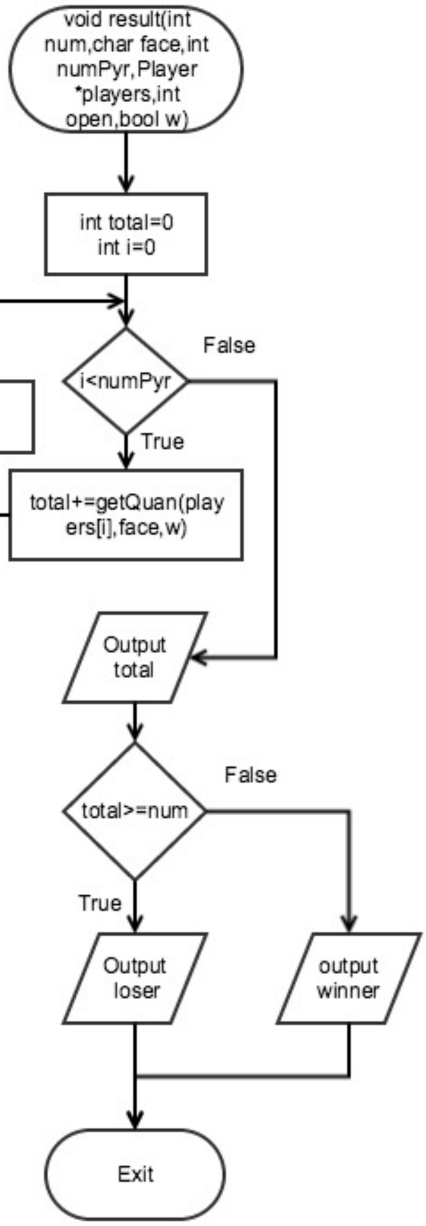


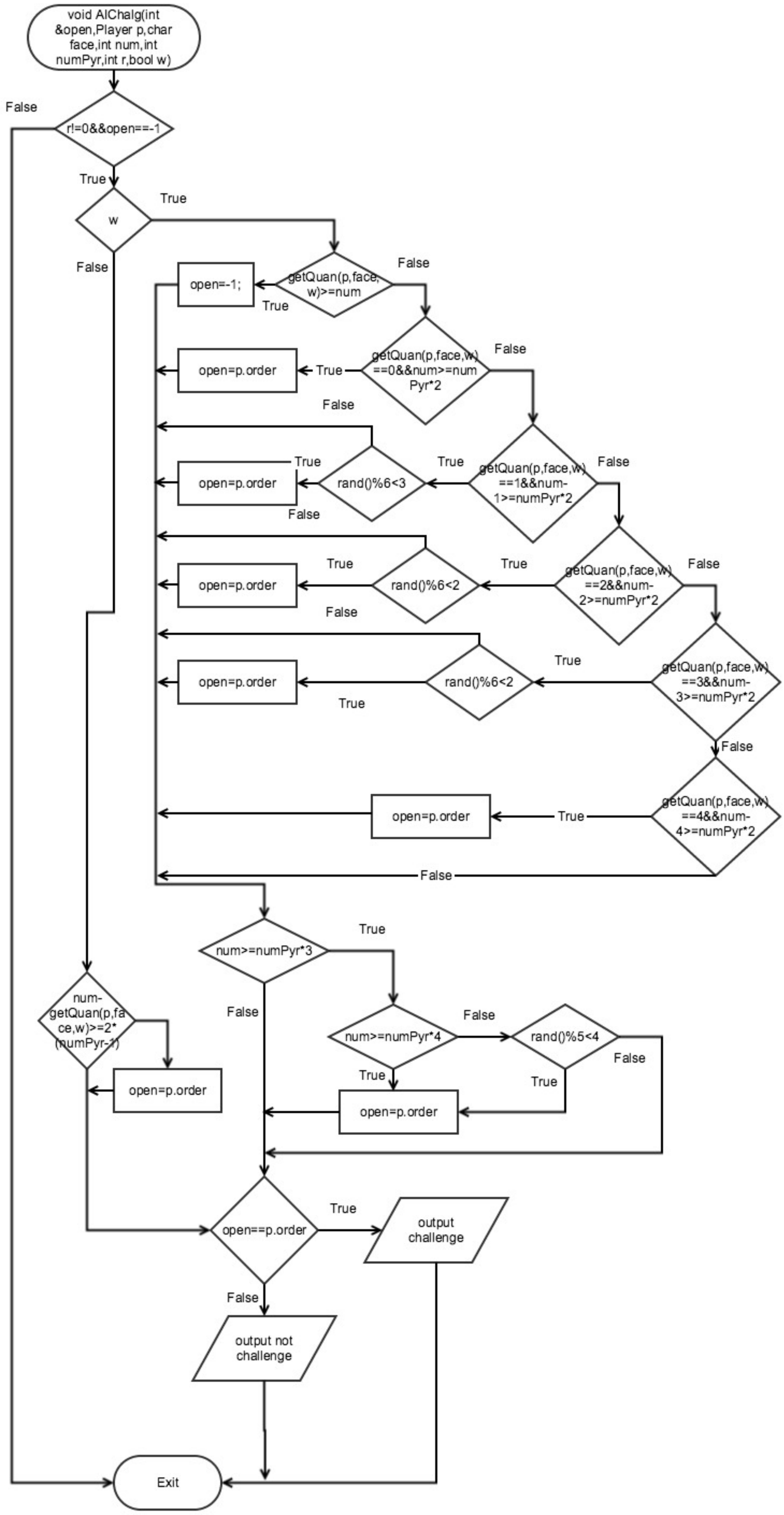


void chalng(Player p,int &open,int r)
string ans="N"
False
r!=0 && open==-1
True
Prompt user for challenge or not
ans!="Y"&&ans!="N"&&ans!="y"&&ans!="n"
True
Output invalid input
False
True
ans!="Y"&&ans!="N"&&ans!="y"&&ans!="n"
False
Exit


int getQuan(Player p,char face,bool w)
int num=0;
int ones=0;
int i=0;
False
i<5
True
p.dices[i]==face
True
num++;
False
w&&face!='1' && p.dices[i]=='1'
True
ones++;
False
i++;
return num+ones
vector<char> getEs(char *dices)
bool inside;
vector<char> exist;
int i=0
False
i<5
True
inside=false
int j=0
j< exist.size()
False
True
j++;
exist[j]==dices[i]
True
inside=true;
False
i++;
!inside
False
True
exist.push_back(dices[i])
return exist
vector<char> getNtEs(char *dices)
vector<char> nExist;
int i=1;
False
i<=6
True
nExist.push_back(i+48);
i++;
int i=0
False
i<5
True
nExist[static_cast<int>(dices[i]-48)-1]='0';
i++;
int i=0
False
i<5
True
int j=i+1
i++;
j<6
False
True
j++;
nExist[i]<nExist[j]
True
char temp=nExist[i];
nExist[i]=nExist[j];
nExist[j]=temp;
False
int i=5
False
i>=0
True
i–
return nExist
nExist[i]=='0'
False
True
nExist[static_cast<int>(dices[i]-48)-1]='0';


char getMtFr(char *dices)
int *temp=new int[5];
int cnt=1;
int hgst;
int indx;
int i=0
False
i<5
True
int j=0
temp[i]=cnt;
cnt=1;
i++
False
j<5
j++
True
True
dices[i]==dices[j]
cnt++
False
hgst=temp[0]
indx=0
int i=0
i++
False
True
i<5
temp[i]>hgst
hgst=temp[i];
indx=i;
True
False
delete []temp;
return dices[indx]


void result(int num,char face,int numPyr,Player *players,int open,bool w)
int total=0
int i=0
False
i<numPyr
i++
True
total+=getQuan(players[i],face,w)
Output total
False
total>=num
True
Output loser
output winner
Exit


void AIChalg(int &open,Player p,char face,int num,int numPyr,int r,bool w)
False
r!=0&&open==-1
True
w
True
False
getQuan(p,face,w)>=num
False
open=-1;
True
getQuan(p,face,w)==0&&num>=numPyr*2
False
open=p.order
True
False
getQuan(p,face,w)==1&&num-1>=numPyr*2
False
True
rand()%6<3
True
open=p.order
False
getQuan(p,face,w)==2&&num-2>=numPyr*2
False
True
rand()%6<2
True
open=p.order
False
True
getQuan(p,face,w)==3&&num-3>=numPyr*2
rand()%6<2
open=p.order
True
False
getQuan(p,face,w)==4&&num-4>=numPyr*2
open=p.order
True
False
num>=numPyr*3
True
False
num-getQuan(p,face,w)>=2*(numPyr-1)
num>=numPyr*4
False
rand()%5<4
False
True
True
open=p.order
open=p.order
open==p.order
True
output challenge
False
output not challenge
Exit

9. UML