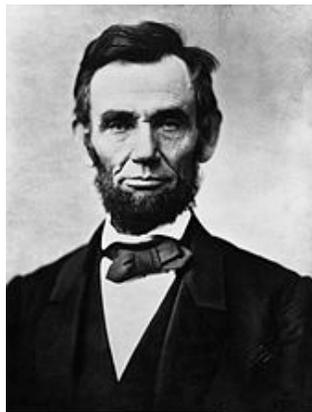


Programming Assignment #4: Name the President Game

Software is commonly used to create educational games. In this project you will create a *Name The President* game that could be used to test the user's knowledge of US presidents.



George Washington



Abraham Lincoln



Franklin D. Roosevelt

Images: https://en.wikipedia.org/wiki/President_of_the_United_States

Play the *Name the President Game!*

Clue #1: The Vice President was Charles Curtis

William Taft? X

Clue #2: His home state was CA

William McKinley? X

Clue #3: His wife's name was Lou

James Buchanan? X

Clue #4: He was the 31st president

Herbert Hoover? ✓ **Correct!**

As you can see from the example above, this will be a challenging game for the user!

President Information

A data file named *Presidents.txt* is available on the course website with information about each of the first 44 US presidents. (Reference: https://en.wikipedia.org/wiki/List_of_Presidents_of_the_United_States)

Part of the data file is shown below:

No.	Last	First	Middle	Vice President(s)	St	SYr	EYr	BYr	A	D	Sp	11111
0000000000	1111111111	2222222222	3333333333	4444444444	5555555555	6666666666	7777777777	8888888888	9999999999	0000000000		
012345678901234567890123456789012345678901234567890123456789012345678901234567890123456789012345												
1	Washington	George		John Adams	VA	1789	1797	1732	57	N	Martha	
2	Adams	John		Thomas Jefferson	MA	1797	1801	1735	61	N	Abigail	
3	Jefferson	Thomas		Aaron Burr	VA	1801	1809	1743	57	N	Martha	
4	Madison	James		George Clinton/Elbridge Gerry	VA	1809	1817	1751	57	N	Dolley	
5	Monroe	James		Daniel Tompkins	VA	1817	1825	1758	58	N	Elizabeth	
6	Adams	John	Quincy	John Calhoun	MA	1825	1829	1767	57	N	Louisa	
7	Jackson	Andrew		John Calhoun/Martin Van Buren	TN	1829	1837	1767	61	N	Rachel	
8	Van Buren	Martin		Richard Johnson	NY	1837	1841	1782	54	N	Hannah	
9	Harrison	William	Henry	John Tyler	OH	1841	1841	1773	68	Y	Anna	
10	Tyler	John		none	VA	1841	1845	1790	51	N	Letitia	
11	Polk	James	K.	George Dallas	TN	1845	1849	1795	49	N	Sarah	
12	Taylor	Zachary		Millard Fillmore	LA	1849	1850	1784	64	Y	Margaret	
13	Fillmore	Millard		none	NY	1850	1853	1800	50	N	Abigail	
14	Pierce	Franklin		William King	NH	1853	1857	1804	48	N	Jane	
15	Buchanan	James		John Breckinridge	PA	1857	1861	1791	65	N	none	
16	Lincoln	Abraham		Hannibal Hamlin/Andrew Johnson	IL	1861	1865	1809	52	Y	Mary	

Note that rows 1-3 provide headings and column numbers. The other rows are organized as follows:

Information	Columns
President Number	0-1
Last Name	4-13
First Name	15-23
Middle Name (or initials)	25-32
Vice President	34-71
Home State	73-74
Starting Year of Presidency	76-79
Ending Year of Presidency	81-84
Year of Birth	86-89
Age when Elected	91-92
Died in Office? (Y or N)	94
Spouse's First Name	96-105

Clues – The user will be provided a series of 10 clues, in random order, from the following list. The blanks below will contain the appropriate information obtained from the data file. The program must use these 10 clues.

- *The first letter of the President's last name is ____.*
- *He was the ____ President of the United States. (Example: 1st, 2nd, 3rd, 4th, etc., including the suffix)*
- *The Vice President's name was ____.*
- *The President's first name is ____.*
- *The President's home state is ____.*
- *The President's term of office is ____.*
- *The First Lady's first name is ____.*
- *The President died (or did not die) in office.*
- *The President was born in the following year: ____;*
- *The age of the President when elected was: ____.*

Rules for playing the Name the President Game (single user option):

- 1) The program will read the information for one **random** President from the data file.
- 2) The program will provide an introductory message and ask the user if they want a summary of the rules (and provide them if requested).
- 3) The program will present the user with the 10 clues above in **random** order.
- 4) The program will keep score. A perfect score is 100. If the user correctly guesses the President after the first clue, their score is 100.
- 5) After each clue the user will be given an option of guessing the President or asking for another clue. The clues should be numbered (from 1 to 10) as they are presented so that the user knows how many clues they have used.
- 6) Each time the user makes an incorrect guess, 5 points will be deducted from their score.
- 7) Each time the user asks for another clue, 5 points will be deducted from their score.
- 8) Display the score after every clue or guess.
- 9) The game will end if their score drops to 0 without correctly guessing the President.
- 10) After the last clue the user should be given the option of guessing the President or giving up. If they give up, display the full name of the President and their final score.
- 11) When the user guesses a President, they should be able to enter the last name using any mixture of uppercase or lowercase letters. If they enter a last name shared by more than one president, they should be prompted to enter additional names or given a choice.

Sample game output: (The output doesn't need to look exactly like this.)

```
Welcome to the Name the President Game!
Would you like a summary of the rules (Y or N)? N
Let's get started. A President has been randomly selected. Here is your first clue:

Clue #1: The Vice President's Name was Levi Morton.
Current Score: 100
Would you like to guess the President (1) or do you want another clue (2)? 2

Clue #2: The President's home state was IN.
Current Score: 95
Would you like to guess the President (1) or do you want another clue (2)? 1
Enter your guess (last name): McKinley
Incorrect. Current Score: 90
Would you like to guess the President (1) or do you want another clue (2)? 2

Clue #3: The President's term of office was 1889 - 1893
Current Score: 85
Would you like to guess the President (1) or do you want another clue (2)? 2

Clue #4: The first letter of the President's last name is H
Current Score: 80
Would you like to guess the President (1) or do you want another clue (2)? 1
Enter your guess (last name): Harrison

Correct! Congratulations! Your final score is 80
```

Program Requirements:

- 1) Creating a class: The program should define **class President** (or pick your own name) according to the following class diagram (or something similar).
 - Use the data members indicated and member functions indicated (or something similar). Additional data members and member functions can be added if you wish.
 - All data members must be private. All member functions must be public.
 - Once the information for the President randomly selected has been accessed using **ReadLine()**, do not open or read from the data file again. All information related to the President should then be accessed using **accessor** functions (**Get...()**), not by reading the file again. Do not define LastName, FirstName, etc., in main. Access them from the class.
 - Do not display values (using cout, for example) from any member function. Access the data using accessor functions and display any desired values within main.
 - Use a member functions to get the Score and to update the Score. Do not define Score in main.
 - Include a constructor function which initializes Score to 100.
 - Use separate header and implementation files for the class (President.h and President.cpp).

Class President	
<u>Member Data:</u> <ul style="list-style-type: none">- Score: int- LastName: string- FirstName: string- MiddleNameOrInitials: string- VicePresident: string- HomeState: string- TermOfOffice: string (or use two ints)- FirstNameWife: string- DeathInOffice: string or char or bool- BirthYear: string or int- AgeWhenElected: string or int	
<u>Member Functions:</u> <ul style="list-style-type: none">+ President();+ ReadLine(); void+ Get_Last_Name(): string+ Get_First_Name(): string+ etc (other member functions)	

Comments:

All data members must be private (-)

Comments:

Constructor – Create new game and initialize Score to 100
Open file, read random line, extract President information
Use Get...() **accessor** functions to access all member data

Add other member functions, including functions to get the Score and to update the Score.

- 2) Main program: The main program should make one game object and make use of member functions to complete the game.
 - Be sure to implement the **Rules for playing the Name the President Game** previously listed.
 - Study the **Sample Game Output** shown previously. Your output does not to look exactly like this example, but the example illustrates many of the requirements.
 - Be sure to follow the guidelines listed under **Creating a class** above.
- 3) Data file: Do not modify the data file provided (Presidents.txt).

Testing your Program

Since the program selects random Presidents and uses a random question order, exact test conditions can't be specified. Instead, run your program and include the results for the following:

- Case 1: Run the program for a President where you made no incorrect guesses but required 3 or more clues before getting the correct answer. The user should enter the President's last name using a mixture of uppercase and lowercase letters. The user should also request a summary of the rules.
- Case 2: Run the program for a President where you guessed the president after every other clue and required 3 or more clues before getting the correct answer.
- Case 3: Run the program for a President where you guessed a President after every clue, but still needed 3 or more clues before getting the correct answer.
- Case 4: Run the program for a President where you used all 10 clues and gave up.
- Case 5: Run the program for a President where you got the correct answer on the first try using all uppercase letters for the President's name (you can peek at the data file if you wish!)
- Case 6: Run the program for a President where you made so many guesses that the score dropped to 0 and the program stopped (but you didn't give up).

Programming Hints:

1. **Random Numbers** – Our text introduces functions to produce random numbers. They may not be covered in this courses unless they are needed for a project. They are needed in this project, so here is a summary:
 - **rand()** – This function produces a pseudo-random number between 0 and 32767 (compiler dependent). It is pseudo-random because it produces the same sequence of number each time it is executed on a given computer. This occurs because the random number is generated using a seed which has a default value of 1.
 - **srand(time(0))** - To make **rand()** produce a random number, we need to first execute **srand(time(0))** which generates a new seed at the current time.
 - Example:

```
# include <ctime> // needed for the time( ) function
# include <cstdlib> // needed for the rand( ) and srand( ) functions
using namespace std;
int main()
{
    srand(time(0)); // include this or else rand( ) produces the same number each run
    int Number1 = rand( )%10; // produces a random number from 0 to 9
    int Number2 = rand( )%30; // produces a random number from 0 to 29
    ...
}
```

- So if you want to read a random number of lines from a file with 44 Presidents, then
2. **Shuffling a list** – We can see how to produce one random number, but how about shuffling a list? Recall that one of the benefits of using the *vector class* is that there are many built-in functions, including one named *random_shuffle()*.

Since we have 10 questions that we would like to present randomly, suppose the numbers 1-9 are placed in a vector named `QuestionOrder`. So the original vector contents are:

1	2	3	4	5	6	7	8	9	10
---	---	---	---	---	---	---	---	---	----

Executing the command below will result in a shuffled vector.

random_shuffle(QuestionOrder.begin(), QuestionOrder.end())

One *possible* result for the shuffled vector is shown below.

7	3	10	9	2	6	4	5	1	8
---	---	----	---	---	---	---	---	---	---

Extra Credit Suggestions: (for a maximum of 10 additional points on the program grade)

1. Add additional clues. For example, the following two clues might be added (for a total of 12 clues):
 - *The last letter of the President's last name is ____.*
 - *The President's served ____ years in office.* (You can calculate this from End_Year – Start_Year.)
2. Allow the user to enter the President's name in various formats. For example:
 - Franklin D. Roosevelt
 - Franklin Roosevelt
 - FDR

Use a more sophisticated approach than a switch or if structure with 44 options. For example, you might use an array, vector, or data file. Do not modify the original data file (Presidents.txt).
3. Instead of displaying the state symbol, such as VA or NC, display the state name, such as Virginia or North Carolina. Use a more sophisticated approach than a switch or if structure with 50 options. For example, you might use an array, vector, or data file. Do not modify the original data file (Presidents.txt).
4. Use your imagination!