

Assignment 2 – Hangman Report Template

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Purpose

Audience for this section: Pretend that you are working in industry, and write this paragraph for your boss. You are answering the basic question, “What does this thing do?”. This section can be short. A single paragraph is okay.

Do not just copy the assignment PDF to complete this section, use your own words.

Questions

Please answer the following questions before you start coding. They will help guide you through the assignment. To make the grader’s life easier, please do not remove the questions, and simply put your answers below the text of each question. To fill in the answers and edit this file, you can upload the provided zip file to overleaf by pressing [New project] and then [Upload project].

Guesses

One of the most common questions in the past has been the best way to keep track of which letters have already been guessed. To help you out with this, here are some questions (that you must answer) that may lead you to the best solution.

- How many valid single character guesses are there? What are they?

There are 29 characters, 26 lowercase letters, spaces, hyphens, and apostrophes.

- Do we need to keep track of how many times something is guessed? Do you need to keep track of the order in which the user makes guesses?

We only need to keep track of if something is guessed, not how many times. Guessed characters should print in alphabetical order, so order the player guessed in does not matter either.

- What data type can we use to keep track of guesses? Keep in mind your answer to the previous questions. Make sure the data type you chose is easily printable in alphabetical order. ¹

We can use a string/char array to keep track of our guesses.

- Based on your previous response, how can we check if a letter has already been guessed. ²

Iterate through the character array and see if the letter provided is already in the array. I would make a short function for this.

¹Your answer should not involve rearranging the old guesses when a new one is made.

²The answer to this should be 1-2 lines of code. Keep it simple. If you struggle to do this, investigate different solutions to the previous questions that make this one easier.

Strings and characters

- Python has the functions `chr()` and `ord()`. Describe what these functions do. If you are not already familiar with these functions, do some research into them.

The `chr()` function takes an ASCII value (integer) and returns the character equivalent. The `ord()` function takes a single character and returns the ASCII value of it.

- Below is some python code. Finish the C code below so it has the same effect. ³

```
x = 'q'
print(ord(x))
```

C Code:

```
char x = 'q';
printf("%d\n", x);
```

- Without using `ctype.h` or **any** numeric values, write C code for `is_uppercase_letter()`. It should return false if the parameter is not uppercase, and true if it is.

```
#include <stdbool.h>
char is_uppercase_letter(char x){
    return x >= 'A' && x <= 'Z' ? 0 : 1;
}
```

- What is a string in C? Based on that definition, give an example of something that you would assume is a string that C will not allow.

C would not allow a String to span multiple lines because it is defined as a Character Array.

- What does it mean for a string to be null terminated? Are strings null terminated by default?

Null terminated means strings that have a null character at the end. They are null terminated by default.

- What happens when a program that is looking for a null terminator and does not find it.

Could cause crashes because program would not know where to stop looking through memory.

- In this assignment, you are given a macro called `CLEAR_SCREEN`. What is it's data type? How and when do you use it?

It is a string and can be used whenever we need to clear our screen by printing it on the screen. It works by using an ANSI escape sequence.

Testing

List what you will do to test your code. Make sure this is comprehensive. ⁴ Remember that you will not be getting a reference binary ⁵.

I will test various invalid inputs like putting in uppercase letters, numbers, etc and making sure the output is expected by doing a test run and comparing it to a textfile I make. I will also test errors we are suppose to catch such as the length of the secret being too long.

³Do not hard code any numeric values.

⁴This question is a whole lot more vague than it has been the last few assignments. Continue to answer it with the same level of detail and thought.

⁵The output of your binary is not the only thing you should be testing!

How to Use the Program

Audience: Write this section for the user of your program. You are answering the basic question, “How do I use this thing?”. Don’t copy the assignment exactly; explain this in your own words. This section will be longer for a more complicated program and shorter for a less complicated program. You should show how to compile and run your program. You should also describe any optional flags or inputs that your program uses, and what they do.

To show “code font” text within a paragraph, you can use `\lstinline{}`, which will look like this: `text`.

For a code block, use `\begin{lstlisting}` and `\end{lstlisting}`, which will look like this:

Here is some code in `lstlisting`.

And if you want a box around the code text, then use `\begin{lstlisting}[frame=single]` and `\end{lstlisting}`

which will look like this:

Here is some framed code (`lstlisting`) `text`.

Want to make a footnote? Here’s how.⁶

Do you need to cite a reference? You do that by putting the reference in the file `bibtex.bib`, and then you cite your reference like `this[1][2][3]`.

To use the program, the user needs to provide the program with a secret word to guess using multiple words, spaces, apostrophes, and hyphens. Then users need to guess the word in question. The game will output the amount of lives the user has remaining using a string representation, and will continue to prompt the user for new guesses until either the user runs out of lives, or wins the game. The user should guess using only lowercase letters.

Program Design

Audience: Write this section for someone who will maintain your program. In industry you maintain your own programs, and so your audience could be future you! List the main data structures and the main algorithms. You are answering the basic question, “How is this thing organized so that I can have a chance of fixing it?”. This section will be longer for a more complicated program and shorter for a less complicated program.

Main Data Structures: Secret Phrase - String, Game state - keeps track of guessed letters and before printing each turn, uses it to check which letters are revealed and which are still hidden, ASCII Art - Array of strings, used to represent number of incorrect guesses made by player. Main Algorithms: Input handling - checking for valid user input, Game Progress - Managing progress of game (such as checking for game winner, hidden and secret letters), Screen Clearing and Displaying - Manages what the user sees.

Pseudocode

Give the reader a top down description of your code! How will you break it down? What features will your code have? How will you implement each function.

```
bool string contains character(const char* s, char c):
loops through char array and checks if c is at loop index.
return true if found or false if not found
```

```
char read letter(void):
asks user for character
reads one letter and returns it
```

⁶This is my footnote.

bool is_lowercase_letter(char c):
checks if given character is lowercase using ASCII values
returns true or false

bool validate_secret(const char* secret):
Takes in secret word and checks if it is valid, returning true or false if not prints out first error character

main function:
uses all functions to make program function

Function Descriptions

For each function in your program, you will need to explain your thought process. This means doing the following

- The inputs of every function (even if it's not a parameter)
- The outputs of every function (even if it's not the return value)
- The purpose of each function, a brief description about a sentence long.
- For more complicated functions, include pseudocode that describes how the function works
- For more complicated functions, also include a description of your decision making process; why you chose to use any data structures or control flows that you did.

Do not simply use your code to describe this. This section should be readable to a person with little to no code knowledge. **DO NOT JUST PUT THE FUNCTION SIGNATURES HERE. MORE EXPLANATION IS REQUIRED.**

References

- [1] Wikipedia contributors. C (programming language) — Wikipedia, the free encyclopedia. [https://en.wikipedia.org/wiki/C_\(programming_language\)](https://en.wikipedia.org/wiki/C_(programming_language)), 2023. [Online; accessed 20-April-2023].
- [2] Robert Mecklenburg. *Managing Projects with GNU Make*, 3rd ed. O'Reilly, Cambridge, Mass., 2005.
- [3] Walter R. Tschinkel. Just scoring points. *The Chronicle of Higher Education*, 53(32):B13, 2007.