Software Engineering

Week 3 – Chapter 3

Evidence

Problem: Develop a small program that handles a list of daily rainfall measurements and performs some analysis on it.

*Rainfall measurements Flowchart:*

*A diagram of a flowchart

Description automatically generated*

In the flowchart I have written step by step how the program will be executed. First I define an empty list, and then I define functions for handling user’s input, calculating the average value of the list, calculating the average of segment of 7 numbers (average for a week), calculating the average value of segment of 30 numbers (average for a month), printing out the info for the total average, weekly average and monthly average. Finally, I call the outputReport() (printing out) function and the program ends.

*Rainfall measurements Code:*

*A screen shot of a computer program

Description automatically generated*

I have used comments above every function to explain what every function does.

Problem: Make a Guess the word game in Python

*Guess the word Flowchart:*

*A diagram of a flowchart

Description automatically generated*



Firstly, the computer picks a random word and stores its letters as blanks in a list. This list will be updated every time a letter is guessed, and a blank will be replaced by a letter.

I define a variable (tries = 10). The wordLength = len(list) step is unnecessary since I do not use the variable, so it should be removed in the future.

Then the computer asks the user to enter a letter. The user inputs a letter. If the input is not only 1 letter (len(letter) != 1) the computer outputs “Invalid input” and asks the user to enter a letter again. If the input is 1 letter, a condition checks if the letter is present in the secret word. If it is not, a condition checks if there is 1 try left. If it’s true, the computer outputs “You lost”. The computer then asks the user if they want to play again, if the answer is yes, the game restarts and if it is not yes, the program ends.

If the condition (tries == 1) is False, the tries decrease by 1 (tries -= 1) and the computer outputs “Wrong letter. Tries left: {tries}” and asks the user to enter a letter again.

If the letter is present in the secret word, a condition checks if the letter is in the list of guessed and unguessed letters. If it is, the computer outputs “Letter already guessed” and asks the user to enter a letter again. If it is not, it replaces the corresponding blank/s with the letter and prints the list. (displays the updated word).

Then, a condition checks if a “\_” is present in the list. If it is, the computer asks the user to enter a letter again. If it is not, the computer prints “You guessed the word in {10 – tries} tries!”. The computer asks the user for another game.

*Guess the word Code:*

*A screen shot of a computer program

Description automatically generated*

I defined a function pickSecretWord() which randomly picks a word from an already defined list of words and returns the picked word. After this I defined a checkIfValidInput() function which checks if the input is only one letter and it is not a digit. Then I defined checkIfLetterInList() returning true or false and checkIfLetterInWord() returning true or false with the number of tries left. Then I defined updateGuessedLetters() which replaces blanks with letters if guessed. checkGameStatus() checks the tries left and determines if you lost or still have tries left. 0 tries left means you lost. askForAnotherGame() asks the user if they want to play again and handles their input, returning true or false. I defined a playGame() function where I call all the functions and use all the logic. Outside I define a playAgain Boolean variable and call the playGame() function in a while. After the playGame() is done I call the askForAnotherGame().

Learning outcomes: When writing the code I stumbled upon a problem – I did not know how to check if an input is a digit or a letter. Using the internet I learned about the function isalpha() which checks if all the characters in a text are letters and used it in the checkIfValidInput() function. I also learned to not make function too long like the playAgain() function so in the future that will be fixed.

Problem: Create a program for the popular game named Mastermind

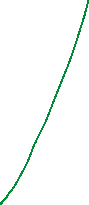
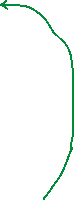
In this game there is a secret code of 4 digits which the user needs to guess. With each guess the user will get some hints to help them with the next guess. The player enters a guess and after each guess the program will show how many digits are in the correct position and how many digits are correct but in the wrong position.

I have heard of this game as Bulls and Cows, so I implemented that idea in this work. Cows are the number of correct digits but in the wrong position and Bulls are the number of digits in correct position.

*Mastermind Flowchart:*

A diagram of a flowchart

Description automatically generated



Firstly, the computer generates random 4-digit number and defines a variable tries = 12. Then comp asks the user to enter a 4-digit number with unique digits. The user enters the number and a condition checks if the length of the input is 4 and if it has only digits. If the condition is false, computer asks the user to enter number again. If it is true, a condition checks if there is a digit in the user’s number present in the random number. (I only update the number of cows and not of the bulls so this something I will get fixed in the future.)

So, a condition should check if a digit from the user’s number is equal to a digit of the secret number and are both in the same place. If that is True, bulls are increased by one and then a condition checks if there is a digit present in the secret number, if it is true, cows are increased by one. Then a condition checks if bulls == 4 in both outcomes. If it is true, the computer print “You guessed the number”. Then it asks the user for another game, if yes, the game restarts, if not, the program ends.

If the bulls are not 4, a condition checks if tries == 1. If true, the computer prints “You ran out of tries” and prints the secret number. Then user is asked for another game. If false, the tries decrease by one and user is ask to enter another number.

*Mastermind Code:*

*A screen shot of a computer program

Description automatically generated*

I have made functions for generating random digits, getting valid input, checking if user’s digit is in random number, playing the game and asking to play again.

* Learning outcomes: I have used comments after I got feedback on my lack of comments in previous programs and now I achieved better readability of my code. I learned of the isdigit() function after I encountered a problem – I couldn’t check if the input is all digits or not. The isdigit() function checks if all the characters in the text are digits.
* I also learned of the random.sample() function. I had a problem with making the program so that it generates 4 unique digits without repetition. This function does just that.
* I learned about the map() function which applies a function to each item in a list. I used it to print the digits in the secret word in one line next to each other without space with join().
* I learned that the join() function is used to combine or concatenate a list (or any iterable) of strings into a single string, with a specified separator in between each element.

Links to the assignments:

Rainfall measurements: [Week 3\Chapter 3\Software Engineering\Rainfall measurements\Rainfall measurements.py](Week%203/Chapter%203/Software%20Engineering/Rainfall%20measurements/Rainfall%20measurements.py)

Guess the word: [Week 3\Chapter 3\Software Engineering\Guess the word\Guess the word.py](Week%203/Chapter%203/Software%20Engineering/Guess%20the%20word/Guess%20the%20word.py)

Mastermind: [Week 3\Chapter 3\Software Engineering\Mastermind\Mastermind.py](Week%203/Chapter%203/Software%20Engineering/Mastermind/Mastermind.py)