System development using Python

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1 August 2022

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Contents

1 Introduction

In this task, I created a program that can ask multiple questions and check the answers to calculate the total score at the end. This program includes base-oriented programming techniques that function efficiently. The introduced program will use basic object-oriented programming techniques using python to run a simple quiz. This quiz has specific requirements that have been achieved and tested to ensure that system can run smoothly and error-free.

2 System testing

For this application, the testing process has been done by running the program and trying different entries each time to observe the system response each time and follow up with the required code fixes to achieve the best practice. In the system, to ensure that the user is not skipping any step, the if statements have been used to check the input every time. The system will ask the user to re-enter a valid answer if the input is empty or invalid. Some of the requirements in the system are to ask the user to enter his response or values, such as entering user names or a number of questions that want to answer. For the username, the system must check the user input if it has any digits or invalid entries.

- For Example: If the name is correctly entered, the system will go to the next question (Overflow, 2015)

```
What is your name? Lisa
How many questions would you like to answer ? the maximum number of questions  is 10 ▊
```

- If the user enters an invalid name (Overflow, 2015)

```
What is your name? as
Enter correct name to proceed to the quiz
asala
How many questions would you like to answer ? the maximum number of questions  is 10 ▯
```

- The system will keep asking the user to enter the correct name. After entering a valid name, the system works. The while statement has been used to clarify the conditions of a valid name, which must be not less than three characters, no digits, and not empty (Overflow, 2015)

```
What is your name? as
Enter correct name to proceed to the quiz
123
Enter correct name to proceed to the quiz
asala
How many questions would you like to answer ? the maximum number of questions  is 10 ▌
```

- In case the name was left empty (W3Schools, 2022b)

```
What is your name?
Enter correct name to proceed to the quiz
▉
```

- **The code snippet for this process:**

```
name = input("What is your name? ").title()

while len(name)== 0 or len(name)< 3 or name.isdigit():

print("Enter correct name to proceed to the quiz")

name=input()

else:

quiz_questions = int(input("How many questions would you like to answer?
the maximum number of
questions is 10 "))

print(Welcoming.format(name=name, n=(quiz_questions)))

play_quiz(name, questions)
```

- For Example: If the user enters an answer not listed in the options or did not answer. In this screenshot, I entered the answer, not in the options. The system asked the user to enter only from the answer options. After that, I tried to keep the input empty, and the system threw the same message again. When the value was correct, the system could continue and evaluate the answer (W3Schools, 2022c).

```
What is the smallest country in the world ?
1. Monaco
2. Nauru
3. Southern France
4. Vatican City
Your answer is: 5
you need to enter one of the answers 1,2,3 or 4

you need to enter one of the answers 1,2,3 or 4
3
Sorry, that is incorrect 🫤
Your current score is 10% out of 40%
```

- Code snippet:

```
response = input("Your answer is: ")

while response not in answers:

print("you need to enter one of the answers 1,2,3 or 4")

response=input()
```

2.1 Testing the number of questions

- In this test, I only specified the number of questions to 2. The system successfully presented only two questions and then stopped (Python, 2022) The results were as shown below:

```
How many questions would you like to answer ? the maximum number of questions  is 10 2
Hello Asala, welcome to the Quiz !
Enter the answer number to proceed to the next question
You will be asked 2 questions.
Best of luck! 😀
What is the smallest unit of memory ?
1. Megabytes
2. Gigabyte
3. kilobytes
4. Terabyte
Your answer is: 1
Sorry, that is incorrect 😐
Your current score is 0% out of 20%
Which UK city is banksy from ?
1. Bristol
2. London
3. Birmingham
4. Manchester
Your answer is: 1
Well done 👍 1 is correct
Your current score is 10% out of 20%
Your final score is 10% out of 20%
Thank you Asala for playing the quiz, goodbye! 😀
Anybody else wants to take the quiz?(yes or no): █
```

- if the user enters an invalid number of questions, the system will ask for valid input (W3Schools, 2022c).

```
How many questions would you like to answer ? the maximum number of questions  is 10 22
you need to enter correct number of questions between 1-10
How many questions would you like to answer ? 2
Hello Asla, welcome to the Quiz !
Enter the answer number to proceed to the next question
You will be asked 2 questions.
Best of luck! 😀
Which animal can be seen on the porshe logo ?
1. zebra
2. moose
3. horse
```

- **Code snippet**

```
numbers=[1,2,3,4,5,6,7,8,9,10]


quiz_questions = int(input("How many questions would you like to answer ?
the maximum number of questions is 10 "))

while quiz_questions not in numbers:

print("you need to enter correct number of questions between 1-10")

quiz_questions = int(input("How many questions would you like to answer ? "))

else:

print(Welcoming.format(name=name, n=(quiz_questions)))

play_quiz(name, questions)
```

2.2 Testing the results with only one user

```
Anybody else wants to take the quiz?(yes or no): no
The Quiz has end
Users Scores
Username: Asala , score: 20 %
User with Maximum score is Asala with score 20 %
Average score= 20 %
```

2.3 Testing the results with multiple users

Printing the dictionary which was used to save all users' data (Thispointer, 2022).

```
The Quiz has end
Users Scores
Username: Dan , score: 20 %
Username: Jim , score: 30 %
User with Maximum score is Jim with score 30 %
Average score= 25 %
```

2.4 Testing the Random Function

- Checking if each user has been presented with different questions (GeeksforGeeks, 2022b)

```
What is your name? asala
How many questions would you like to answer ? the maximum number of questions  is 10 2
Hello Asala, welcome to the Quiz !
Enter the answer number to proceed to the next question
You will be asked 2 questions.
Best of luck! 😀
Which UK city is banksy from ?
1. Bristol
2. London
3. Birmingham
4. Manchester
Your answer is: `
you need to enter one of the answers 1,2,3 or 4
1
Well done 👍 1 is correct
Your current score is 10% out of 20%
Where is the smallest bone in human ?
1. Back
2. Ear
3. Finger
4. Leg
Your answer is: 1
Sorry, that is incorrect 🥴
Your current score is 10% out of 20%
Your final score is 10% out of 20%
Thank you Asala for playing the quiz, goodbye! 😀
Anybody else wants to take the quiz?(yes or no): yes
What is your name? JIM
How many questions would you like to answer ? 2
How many hearts does an octopus have ?
1. 7
2. 1
3. 2
4. 3
Your answer is: 1
Sorry, that is incorrect 🥴
Your current score is 0% out of 20%
What is the smallest unit of memory ?
1. Megabytes
2. Gigabyte
3. kilobytes
4. Terabyte
Your answer is: 1
Sorry, that is incorrect 🥴
Your current score is 0% out of 20%
Your final score is 0% out of 20%
Thank you Jim for playing the quiz, goodbye! 😀
Anybody else wants to take the quiz?(yes or no): ▯
```

3 Testing types

Each user will be asked before playing the quiz how many questions wants to answer, and the program will take the input and convert it from string to integer so it can be

used later. The default input type is a string; if the input is used with the default type, the system will give an error (freecodecamp, 2021).

```
quiz_questions = int(input("How many questions would you like to answer ? "))
```

4 System Functionalities

4.1 Importing Libraries

The advantage of using these ready libraries is to access ready functions to make it faster to program a system. I used libraries such as collections, Tkinter, and random in this system to make the quiz. Collections library has a named tuple function that has been given all the questions in the quiz with their answers as an object to organize into a tuple. Tkinter has the Question to present the questions and answer for the quiz purposes (GeeksforGeeks, 2022a). The random library has made the questions presented in random orders. Finally, the emoji library was called to print out some effects within the system output (GeeksforGeeks, 2022c).

- The libraries were imported using this code:

```
from collections import namedtuple

from tkinter.messagebox import QUESTION

import random

import emoji
```

- "Namedtuple" was used with the question:

```
Question= namedtuple("Question", ["question", "answers", "correct_answer"])
```

- Random was used where the questions were called:

```
def user_questions(questions_num):

questions_num = min(questions_num, len(questions))

return random.sample(questions, k=questions_num)
```

- "Question" has been used within each quiz question:

```python
questions = [Question("Which planet has the most moons ? ",

["Saturn", "Mercury", "Venus", "Uranus"], "1"),

Question("Where is the smallest bone in human ? ",

["Back", "Ear", "Finger", "Leg"], "2",),

Question("How many hearts does an octopus have ? ",

["7", "1", "2", "3"], "4",),

Question("Which city had the first ever fashion week ? ",

["New York", "Paris", "France", "Italy"], "1",),

Question("What is the smallest country in the world ? ",

["Monaco", "Nauru", "Southern France", "Vatican City"], "4",),

Question("Which london underground line has the most stations ? ",

["Bond Street", "Westminster", "Central", "District line"], "4",),

Question("Which UK city is banksy from ? ",

["Bristol", "London", "Birmingham", "Manchester"], "1",),

Question("What is the smallest unit of memory ? ",

["Megabytes", "Gigabyte", "kilobytes", "Terabyte"], "3",),

Question("Which animal can be seen on the porshe logo ? ",

["zebra", "moose", "horse", "Okapi"], "3",),

Question("What is your body's largest organ ",

["brain", "liver", "spleen", "Skin"], "4",)
]
```

- Emoji library was called with the system output (GeeksforGeeks, 2022c)

```python
if response != question.correct_answer:
```

```
print(emoji.emojize("Sorry, that is incorrect :zipper-mouth_face:"))

else:

print(emoji.emojize(f'Well done :thumbs_up: {response} is correct '))
```

```
    Well done 👍 1 is correct
Sorry, that is incorrect 🤐
```

4.2 Name

Asks the user their name which takes the username as an input and assign it to an object
called "name" (Python, 2022)

```
  What is your name? asala
```

- **Code snippet**

```
name = input("What is your name? ").title()
```

4.3 Questions and scores

A function will run through all the specified quiz questions and keep a running score of
the number of correct questions answered when the users have answered all the questions.
The system prints out their score from the number of questions taken as a percentage
score on the screen (Python, 2022). For loop was used to run through all questions while
counting the score:

You will be asked 3 questions.
Best of luck! 😃
Which UK city is banksy from ?
1. Bristol
2. London
3. Birmingham
4. Manchester
Your answer is: 1
Well done 👍 1 is correct
Your current score is 10% out of 30%
What is the smallest country in the world ?
1. Monaco
2. Nauru
3. Southern France
4. Vatican City
Your answer is: 1
Sorry, that is incorrect 🤐
Your current score is 10% out of 30%
What is the smallest unit of memory ?
1. Megabytes
2. Gigabyte
3. kilobytes
4. Terabyte
Your answer is: 3
Well done 👍 3 is correct
Your current score is 20% out of 30%
Your final score is 20% out of 30%
Thank you Asala for playing the quiz, goodbye! 😃
The Quiz has end
Users Scores
Username: Asala , score: 20 %
Username: Yas , score: 20 %
Username: Rai , score: 10 %
Username: Laura , score: 0 %
User with Maximum score is Asala with score 20 %
Average score= 12 %

- If the user has answered ten questions the score will be out of 100%, as shown below:

```
Your current score is 30% out of 100%
Your final score is 30% out of 100%
```

- **code snippet**

```python
def play_quiz(name, questions):


# The function will only run through a specific number of questions the user has selected

questions = user_questions(

questions_num=quiz_questions

)

score = 0


# For Loop that runs through questions and their answers

for question in questions:

print(question.question)

for i, answer in enumerate(question.answers, start=1):

print(f"{i}. {answer}")


answers=["1","2","3","4"]


# The user will enter his/her answer here.

response = input("Your answer is: ")
```

```python
# if user enter different answer not listed in the option,
the program will raise error and ask for corrent entry.

while response not in answers:

print("you need to enter one of the answers 1,2,3 or 4")

response=input()



# After the user answers the question, the program will raise a message saying whether th

# The program will not add a score if the answer is incorrect. Instead, it will print the

# If the answer is correct, the program will add a score.



if response != question.correct_answer:

print(emoji.emojize("Sorry, that is incorrect :zipper-mouth_face:"))

else:

print(emoji.emojize(f'Well done :thumbs_up: {response} is correct '))

# Counter to calculate the score.

score += 1



# When the user finishes the quiz, the program will save the user
name and score in a dictionary that has been declared before.

# This way will make the data easily accessible for later use and can be
called all at once.

myDict[name]=int((score/10)*100)
```

```
# Print the current score while the quiz is running

print(f"Your current score is {int((score/10)*100)}% out of {int(len(questions)*10)}%")



# Print the final score for the user.

print(f"Your final score is {int((score/10)*100)}% out of {int(len(questions)*10)}%")

print(f"Thank you {name} for playing the quiz, goodbye! \U0001f600")
```

4.4 Another user

The program asks if anybody else wants to take the quiz using a while loop to perform
the quiz again (programiz, 2022b) .

```
What is your name? Yara
How many questions would you like to answer ? the maximum number of questions  is 10 1
Hello Yara, welcome to the Quiz !
Enter the answer number to proceed to the next question
You will be asked 1 questions.
Best of luck! 😀
How many hearts does an octopus have ?
1. 7
2. 1
3. 2
4. 3
Your answer is: 1
Sorry, that is incorrect 🫤
Your current score is 0% out of 10%
Your final score is 0% out of 10%
Thank you Yara for playing the quiz, goodbye! 😀
Anybody else wants to take the quiz?(yes or no): yes
What is your name? Lara
How many questions would you like to answer ? 1
Which UK city is banksy from ?
1. Bristol
2. London
3. Birmingham
4. Manchester
Your answer is: 1
Well done 👍 1 is correct
Your current score is 10% out of 10%
Your final score is 10% out of 10%
Thank you Lara for playing the quiz, goodbye! 😀
Anybody else wants to take the quiz?(yes or no): yes
What is your name? Lana
How many questions would you like to answer ? 1
Which planet has the most moons ?
1. Saturn
2. Mercury
3. Venus
4. Uranus
Your answer is: 2
Sorry, that is incorrect 🫤
Your current score is 0% out of 10%
Your final score is 0% out of 10%
Thank you Lana for playing the quiz, goodbye! 😀
Anybody else wants to take the quiz?(yes or no): █
```

- **Code snippet**
- The function was declared globally with if statement with condition returns true if the user enters yes!

```
def competitor():

new_user = input("Anybody else wants to take the quiz?(yes or no): ")

new_user = new_user.upper()

if new_user =="YES":
```

```
return True

else:

return False
```

- Then, the function was called with a while statement, so if the function returned true, the quiz would start again.

```
while competitor():

name = input("What is your name? ").title()

quiz_questions = int(input("How many questions would you like to answer ? "))


play_quiz(name,questions)

print("The Quiz has end")
```

5 Users, Maximum and Average score

- When all the users have finished the quiz the program will output:

1. All of the users' scores (Thispointer, 2022).
2. The name of the user with the highest score (programiz, 2022a)
3. The average score of all users (Campbell, 2020).

```
The Quiz has end
Users Scores
Username: Asala , score: 20 %
Username: Yas , score: 20 %
Username: Rai , score: 10 %
Username: Laura , score: 0 %
User with Maximum score is Asala with score 20 %
Average score= 12 %
```

- **Code snippet**

```
# Print each user name with the score.

print("Users Scores")

for key,value in myDict.items():

print('Username:', key, ',','score:',value,"%")



# Find the user with the highest score.

find_max =max(myDict, key=myDict.get)

print("User with Maximum score is", find_max, "with score", myDict[find_max],"%")



# Find the average score.

average= myDict.values()

average_score= sum(average)/len(average)

print("Average score=", int(average_score),"%")
```

5.1 Specify the number of questions

- The user can specify the number of questions to be presented in the quiz (Python, 2022)

```
How many questions would you like to answer ? the maximum number of questions  is 10 2
Hello Asala, welcome to the Quiz !
Enter the answer number to proceed to the next question
You will be asked 2 questions.
Best of luck! 😊
What is the smallest unit of memory ?
1. Megabytes
2. Gigabyte
3. kilobytes
4. Terabyte
Your answer is: 1
Sorry, that is incorrect 🙁
Your current score is 0% out of 20%
Which UK city is banksy from ?
1. Bristol
2. London
3. Birmingham
4. Manchester
Your answer is: 1
Well done 👍 1 is correct
Your current score is 10% out of 20%
Your final score is 10% out of 20%
Thank you Asala for playing the quiz, goodbye! 😊
Anybody else wants to take the quiz?(yes or no): █
```

- **The code snippet**
- First, we need to create a function (W3schools, 2022).

```python
def user_questions(questions_num):

questions_num = min(questions_num, len(questions))

return random.sample(questions, k=questions_num)
```

- At the beginning of the quiz, the user_questions () function will be called before running through questions (W3schools, 2022).

```python
def play_quiz(name, questions):

  # The function will only run through a specific number of questions
  the user has selected.

questions = user_questions(

questions_num=quiz_questions

)
```

Each user will be asked before playing the quiz how many questions wants to answer, but before using the input the system must convert it into an integer, otherwise, it will give an error (Karma, 2022)

```python
quiz_questions = int(input("How many questions would you like to answer ? "))
```

5.2 Random Questions

```
What is your name? asala
How many questions would you like to answer ? the maximum number of questions  is 10 2
Hello Asala, welcome to the Quiz !
Enter the answer number to proceed to the next question
You will be asked 2 questions.
Best of luck! 😀
Which UK city is banksy from ?
1. Bristol
2. London
3. Birmingham
4. Manchester
Your answer is: `
you need to enter one of the answers 1,2,3 or 4
1
Well done 👍 1 is correct
Your current score is 10% out of 20%
Where is the smallest bone in human ?
1. Back
2. Ear
3. Finger
4. Leg
Your answer is: 1
Sorry, that is incorrect 😋
Your current score is 10% out of 20%
Your final score is 10% out of 20%
Thank you Asala for playing the quiz, goodbye! 😀
Anybody else wants to take the quiz?(yes or no): yes
What is your name? JIM
How many questions would you like to answer ? 2
How many hearts does an octopus have ?
1. 7
2. 1
3. 2
4. 3
Your answer is: 1
Sorry, that is incorrect 😋
Your current score is 0% out of 20%
What is the smallest unit of memory ?
1. Megabytes
2. Gigabyte
3. kilobytes
4. Terabyte
Your answer is: 1
Sorry, that is incorrect 😋
Your current score is 0% out of 20%
Your final score is 0% out of 20%
Thank you Jim for playing the quiz, goodbye! 😀
Anybody else wants to take the quiz?(yes or no): ▯
```

- **Code snippet**
- To import the library (GeeksforGeeks, 2022b).

```
import random
```

- When calling the questions, the code produces a new sample of specified questions in a new order (GeeksforGeeks, 2022b).

```
random.sample(questions, k=questions_num)
```

5.3 Evaluate the answer and return the correct answer if incorrect

- The if statements were used to return the user's answer and evaluate it. If the user enters an incorrect answer(W3Schools, 2022a), it will print a message saying the answer is incorrect and the correct answer as shown below:

```
What is your body's largest organ
1. brain
2. liver
3. spleen
4. Skin
Your answer is: 1
Sorry, that is incorrect 🤐 , the correct answer is Skin
```

- **Code snippet**

```
if response != question.correct_answer:

print(emoji.emojize(f"Sorry, that is incorrect :zipper-mouth_face: ,
the correct answer is {answer}"))

else:

print(emoji.emojize(f'Well done :thumbs_up: {response} is correct '))

# Counter to calculate the score.

score += 1
```

6 Conclusion

This quiz has been running smoothly and error-free. For more advanced programs we can implement more functions to extend the program features.

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