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Report Submitted to:

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Declaration Statement:

All team members hereby declare that this project work entitled "Future Path: IAU Major Advisor" submitted to Ms. Sara Alissa, is a record of CS516: Advanced Programming Language course is done and programmed by project team members. The work of this project is submitted in the partial fulfillment of a bachelor's degree in Computer Science in Imam Abdulrahman bin Faisal University. The results embodied in this thesis have not been submitted to any other University or Institute for the award of any other degrees or diploma.

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1. Problem Statement:

We will use both Prolog and Python to build a chatbot that helps students decide on a collage major. We will write the rules in a way that helps the system advise the user on the right major for them.

2. Project Goals and Objectives/Deliverables:

Our objectives of this work can be stated as follow:

- Using Prolog and Python to run and operate this expert system
- The system will start asking the user some questions about their interests to help them decide on a major
- Allow the user to inter input (answers to the questions)

3. Introduction:

High school graduates face major difficulty in selecting specialty field that suites them. A number of students quit their studies at the university due to the fact that they cannot cope with the courses requirements of the major they have chosen. Unfortunately, such kind of students discover their inability to handle their selected major courses requirements after a significant period of time has passed in their academic life. Hence, we thought that this particular problem can be solved using Artificial Intelligence which provides 24/7 availability with autonomous feedback and higher accuracy results which will help the students to make the right specialization choice. In this project, we have introduced an IAU Major Advisor Rule-Based Expert System, which provides a systematic method compatible with IAU acceptance standards. These standards are calculated with the following weight: 30% High School GPA, 30% Qudorat score, and 40% Tahsili score. The system will use the obtained weighted score to avail the majors that accept student weighted score. At this stage, the system will ask the student specific questions which are mainly related to competences and skills that meet the field fundamental requirements on those potential majors.

Based on the student's responses to those questions, the system will list all of the suitable majors that fit his/her scores and capabilities. In this paper, we will discuss project scope and success criteria, then we will show the implementation and testing for both languages, prolog and python, then followed by a comparison between the two languages.

4. Project Scope:

This project is built to help high school students decide on the right major for them based on their interests and abilities.

5. Success Factors and Benefits:

In building our expert system we worked towards a system that can give a suitable major suggestion for the student, can jump between different scenarios, and can perform error handling for non-understandable cases.

In addition, we considered the following criteria:

- **User-friendliness:** We consider the interface of the system to be user-friendly, as the messages are clear and the instructions are typed with each question. Also, it is fairly simple and easy on the eyes. Even though it is a textual simple user interface, the user can feel like talking to a nice person.
- **Coverage:** We tried to cover the most needed majors in the market, this is why we chose the 10 we have now. The downside is that this expert system serves only the students in the scientific track in high school, not the non-scientific track.
- **Efficiency:** We tested the efficiency of the system in the case where a major is not added to the suitable majors list unless the user answers yes to the majority of the questions.

6. Limitations/Restrictions:

This system is limited in the sense of time and resources, so it could be improved to have more majors and to cover multiple universities. Also, this system could have a graphical user interface with OOP.

7. Selected programming language 1: Prolog

The first programming language we chose is Prolog. In this section we will discuss the analysis and design of our system.

I will take you through logic behind the expert system step by step:-

1. The program will start running when the user types **go**.

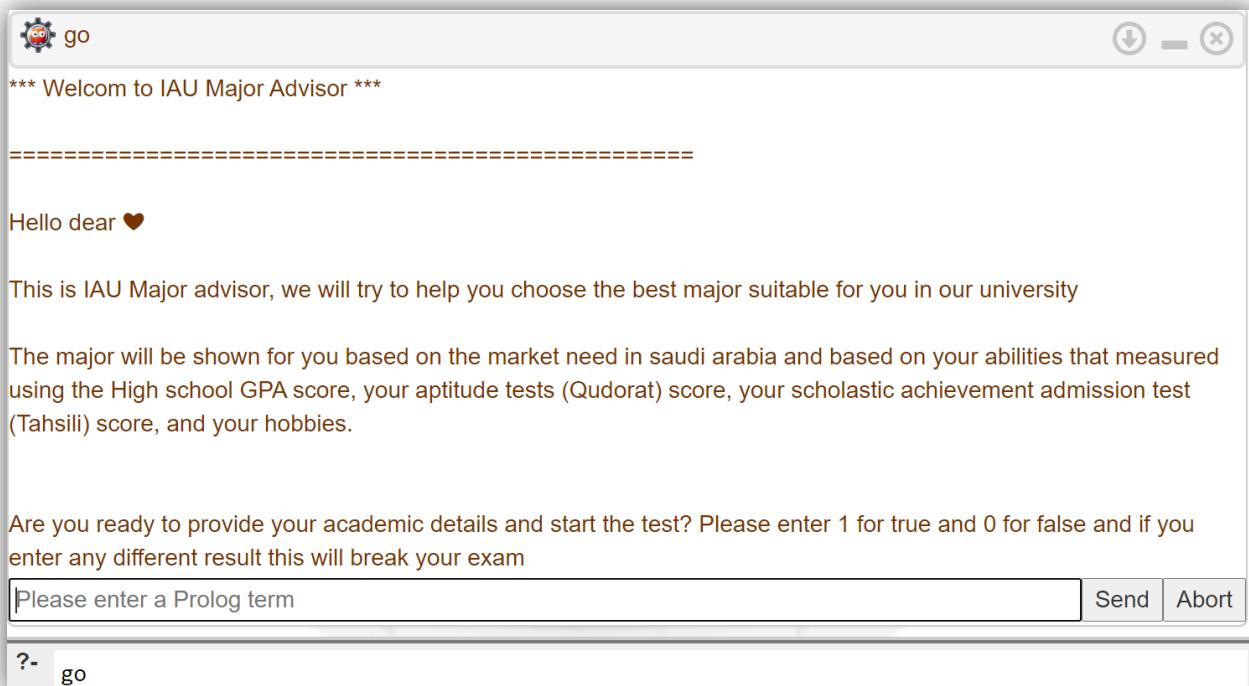


Figure 1: running the system

2. The system will start greeting the user, then asking them if they are ready to provide their academic details or not.
 - **If the user is ready:** they should type 1, the system will start asking about their academic details (The user's **name**, **Tahsili(GAT) score**, **Qudorat(SAT) score**, and **High School GPA score**), then the system will calculate the **overall score** as follows:

$$30\% \text{ SAT Score} + 30\% \text{ High School GPA Score} + 40\% \text{ GAT Score}$$

Are you ready to provide your academic details and start the test? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

===== Academic Details =====

What is your name?

Write your High School GPA Score:

Write your aptitude tests (Qudorat) Score:

Write your scholastic achievement admission test (Tahsili) Score:

Your overall score is= 95.15

===== Start The Test =====

Are you assertive and confident in making decisions? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

Figure 2: Academic details

- **If the user is not ready:** they should type 0, and the system will end.

*** Welcom to IAU Major Advisor ***

Hello dear ❤

This is IAU Major advisor, we will try to help you choose the best major suitable for you in our university

The major will be shown for you based on the market need in saudi arabia and based on your abilities that measured using the High school GPA score, your aptitude tests (Qudorat) score, your scholastic achievement admission test (Tahsili) score, and your hobbies.

Are you ready to provide your academic details and start the test? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

thanks for visiting us and we would like to talk with you again ❤.

1

Figure 3: user is not ready

- **If the user's overall score is less than 50:** the system will show a message that the scores are unreal, and ask them again to type their academic details.

===== Academic Details =====

What is your name?

Write your High School GPA Score:

Write your aptitude tests (Qudorat) Score:

Write your scholastic achievement admission test (Tahsili) Score:

Your overall score is= 36.0

you have entered a wrong score values! please re write your accrual scores!

===== Academic Details =====

What is your name?
 Send Abort

Figure 4: overall score <50

- If the user's overall score is greater than 50 and less than 64: the system will show a message that there is no suitable major in our university, and advise the user to try to get a higher overall score.

===== Academic Details =====

What is your name?

Write your High School GPA Score:

Write your aptitude tests (Qudorat) Score:

Write your scholastic achievement admission test (Tahsili) Score:

Your overall score is= 56.0

=====

There is no suitable major in the system for you in our university ✗ ⊓ ✗, try to have higher overall scores to study in our university ❤

=====

We hope that we have helped you, would you like to repeat the test or exit the system? Please enter 1 for yes or 0 to exit

Figure 5: overall score is greater than 50 and less than 64

- If the user overall score is equal to or greater than 64: there will be a list of the questions asked for the user of each major based on its overall score range:

===== Academic Details =====

What is your name?
reem

Write your High School GPA Score:
99.5

Write your aptitude tests (Qudorat) Score:
89

Write your scholastic achievement admission test (Tahsili) Score:
90

Your overall score is= 92.55

===== Start The Test =====

Are you assertive and confident in making decisions? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

Figure 6: overall score is equal to or greater than 64

Table 1 Majors overall scores

Major	Overall score
Business Administration	64 and more
Nursing	79 and more
Graphic Design	84 and more
Interior Design	84 and more
Industrial Design	84 and more
Computer Science	85 and more
Artificial Intelligence	85 and more
Cyber Security	85 and more
Clinical Pharmacy	85 and more

Medicine	92 and more
----------	-------------

The system asks the user 3 questions on the majors that are compatible with the overall score and the user answers them with yes(1) or no(0):

- **If the user answers two questions with 1 (yes) and one question with 0 (no):**

continue and ask the remaining two questions and count the number of 1 answers and count the number of 0 answers if the majority of the questions answers is 1 then add it to the result as a suitable major.

===== Start The Test =====

Are you assertive and confident in making decisions? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

Can you deal with different personalities? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

Do you take initiative in company growth? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

Are you good in analyzing data and numbers? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

Do you consider yourself a well-organized person? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

=====

If you did not find any valid majors means nothing fits you in our university ✕∩✖

'The best suitable major for you is :Business Administration

Figure 7: user answers two questions with 1 and one question with 0

- If the user answers two questions with 0 (no) and 1 question with 1(yes): stop asking about the current major and move to ask about another major compatible with the overall score, and do the previous step of asking 3 questions again in the next major.

Are you able to work under pressure efficiently while maintaining a positive attitude? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

Do you respect people regardless of age or gender or marital status? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

Do you have a great memory or and are you interested in science? Please enter 1 for true and 0 for false and if you enter any different result this will break your exam

=====

If you did not find any valid majors means nothing fits you in our university ✕ □ ✕

The best suitable major for you is :

Figure 8: user answers two questions with 0 and 1 question with 1

The list of questions is here:

Table 2 Majors questions

Major	Questions
Business Administration	1- Are you assertive and confident in making decisions? 2- Can you deal with different personalities? 3- Do you take initiative in company growth? 4- Are you good in analyzing data and numbers? 5- Do you consider yourself a well-organized person?
Nursing	1- Are you able to work under pressure efficiently while maintaining a positive attitude?

	<p>2- Do you respect people regardless of age, gender or marital status?</p> <p>3- Do you have a great memory, and are you interested in science?</p> <p>4- Are you patient, active, and do you love to work with children?</p> <p>5- Are you interested in working with patients, and do you have a strong sense of responsibility and sound judgment?</p>
Graphic Design	<p>1- Are you open to criticism and dealing with clients?</p> <p>2- Do you have a creative talent and an artistic way of thinking?</p> <p>3- Are you open minded and willing to work outside from your comfort zone?</p> <p>4- Do you have strong opinions about what you like and don't like in a particular field?</p> <p>5- Are you interested in photography and film making?</p>
Interior Design	<p>1- Do you mentally rearrange the furniture every time you enter a new place?</p> <p>2- Are you interested in the many decor styles?</p> <p>3- Do you like working with forms, designs and patterns?</p> <p>4- Are you interested in design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models?</p> <p>5- Are you confident in your creativity? Do you like coming up with new ideas?</p>
Industrial Design	<p>1- Do you like inventing and coming up with new solutions to existing or non-existing problems?</p> <p>2- Are you willing to work with customers and new people every day?</p>

	<p>3- Do you have an excellent sense of design?</p> <p>4- Do you like to experiment with better and faster ways of doing things?</p> <p>5- Are you patient and open to criticism?</p>
Computer Science	<p>1- Are you usually patient and good in working with a team?</p> <p>2- Do you think creatively, critically or outside the box?</p> <p>3- Do you have problem solving and high mathematical skills?</p> <p>4- Do you have a good evaluation sense and analytical skills?</p> <p>5- Are you interested in programming and solving technical problems?</p>
Artificial Intelligence	<p>1- Do you have problem-analysis skills with a logical reflection?</p> <p>2- Do you have a solid mathematical and statistical background?</p> <p>3- Are you overly observant and fast performing?</p> <p>4- Do you like to develop yourself and abreast of all technological developments around you?</p> <p>5- Do you have an interest in artificial intelligence and machine learning?</p>
Cyber Security	<p>1- Do you have the ability to work under stress?</p> <p>2- Are you interested to learn about the security and hacking?</p> <p>3- Do you have the problem solving skills?</p> <p>4- Are you passionate about computer forensics?</p> <p>5- Do you pay attention to details?</p>
Clinical Pharmacy	<p>1- Do you have a patience and communication skills to work with the patient?</p>

	<p>2- Do you have a good memory to deal with variety of diseases?</p> <p>3- Do you have the ability to serve as a front-line educator?</p> <p>4- Are interested to do a round with the doctors to the patient?</p> <p>5- Are you ready to update your knowledge frequently in medicines and diseases?</p>
Medicine	<p>1- Do you have the ability to work for long hours and often under pressure?</p> <p>2- Can you tolerate anatomy sessions starting from animals to human beings?</p> <p>3- Do you have analytical ability?</p> <p>4- Do you have the ability to promote health education?</p> <p>5- Do you have good practical skills?</p>

3. After the user finishes answering all the test questions, the result will display as a list of suitable majors for the user based on the market needs, their abilities, and its academic level in descending order(best suited - to worse suited).

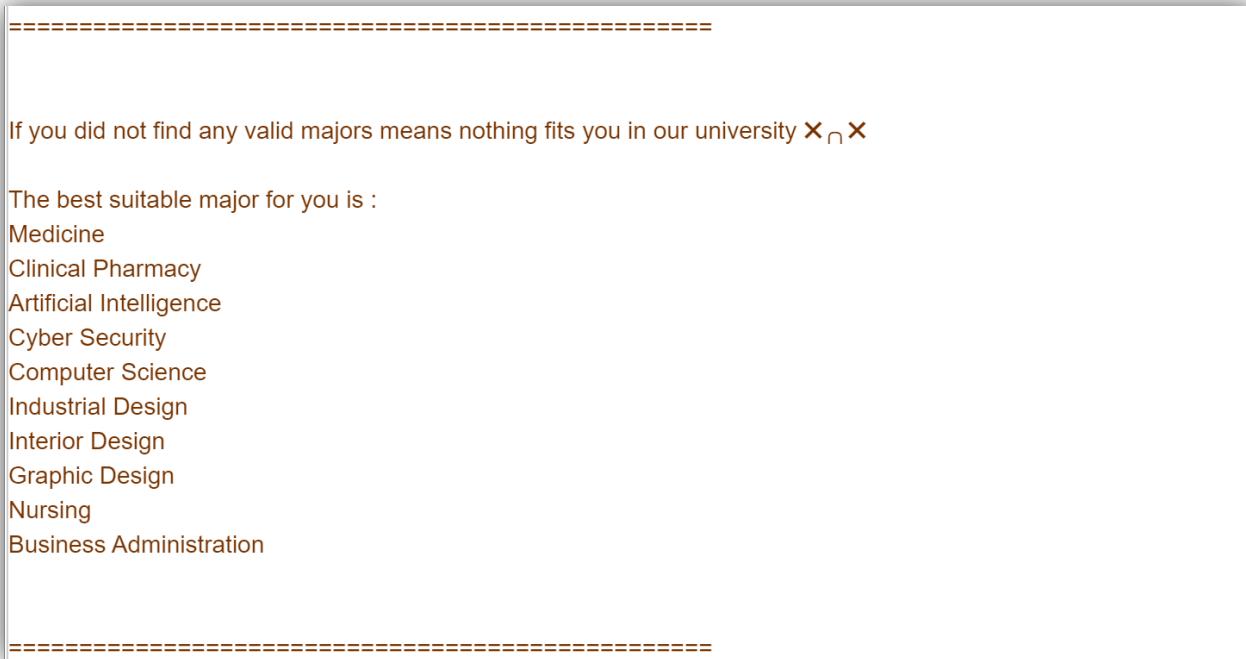


Figure 9: list of suitable majors

4. After the result is shown to the user, the system asks the user if they want to take the test again, and the user will answer:

- **If the user types 1:** the system will ask the user about their academic details again and repeat the flow based on the overall score.

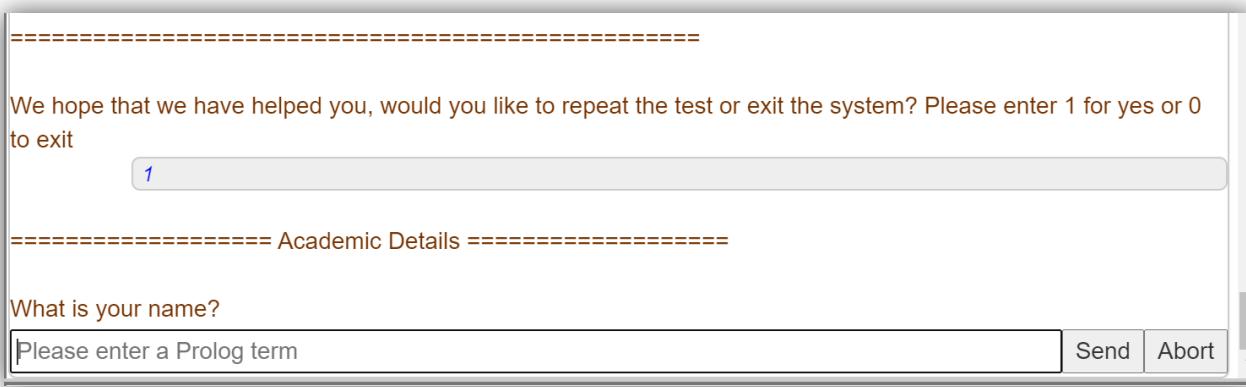


Figure 10: take the test again

- **If the user types 0:** the system will show a thanking message to the user, and then the system will end.

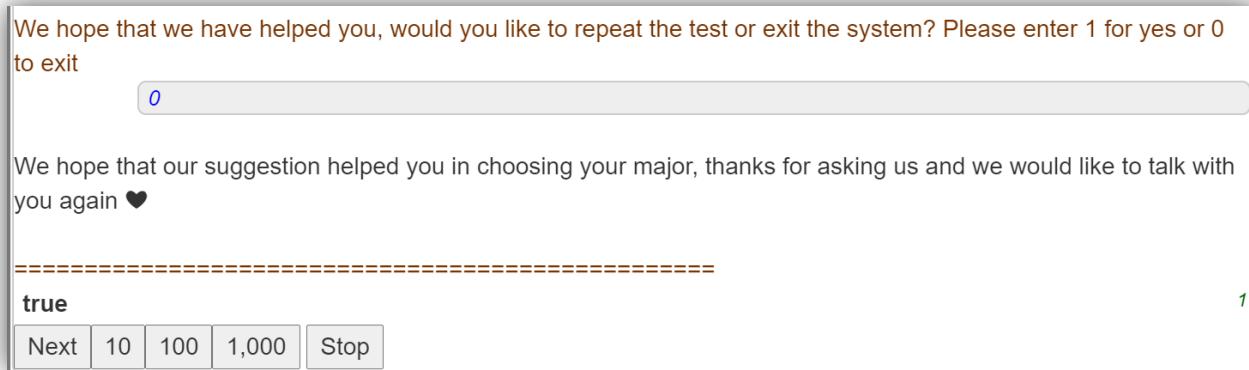


Figure 11: thanking message and system end

8. Selected programming language 2: Python

The system will start greeting the user, then asking them if they are ready to provide their academic details or not. If the user is not ready, he/she should type 0 and the system will end. Otherwise, If the user is ready then he/she should type 1, then the system will start asking about their academic details (The user's name, Tahsili(GAT) score, Qudorat(SAT) score, and High School GPA score), then the system will calculate the overall score as discussed in section 7.

```
*** WELCOME TO IAU MAJOR ADVISOR ***
=====
Hello dear.
This is IAU Major Advisor, we will try to help choose the best major suitable for you in our university
The major will be shown for you based on the market need in Saudi Arabia and based on your abilities that measured using
the High school GPA score, your aptitude tests (Qudorat) score, your scholastic achievement admission test (Tahsili) score, and your hobbies.

Are you ready to provide your academic details and start the test ?
Please enter 1 to start or any other number to break the test
0
thanks for visiting us and we would like to talk with you again ❤

Process finished with exit code 0
```

Figure 12 Welcome to IAU MAJOR ADVISOR – Type 2 case

```
*** WELCOM TO IAU MAJOR ADVISOR ***
=====
Hello dear.
This is IAU Major Advisor, we will try to help choose the best major suitable for you in our university
The major will be shown for you based on the market need in Saudi Arabia and bassed on your abilities that measured using
the High school GPA score, your aptitude tests (Qudorat) score, your scholastic achievement admission test (Tahsili) score, and your hobbies.

Are you ready to provide your academic detailsand start the test ?
Please enter 1 to start or any other number to break the test
1
===== ACADEMIC DETAILS =====
What is your name ? |
```

Figure 13 Welcome to IAU MAJOR ADVISOR – Type 1 case

If the user's overall score is less than 50: the system will show a message that the scores are unreal and ask them again to type their academic details.

```
Hello dear.
This is IAU Major Advisor, we will try to help choose the best major suitable for you in our university
The major will be shown for you based on the market need in Saudi Arabia and bassed on your abilities that measured using
the High school GPA score, your aptitude tests (Qudorat) score, your scholastic achievement admission test (Tahsili) score, and your hobbies.

Are you ready to provide your academic detailsand start the test ?
Please enter 1 to start or any other number to break the test
1
===== ACADEMIC DETAILS =====
What is your name ? Ahmed
write your High School GPA Score: 50
write your aptitude tests (Qudorat) Score: 30
write your scholastic achievement admission test (Tahsili) Score: 30
Your overall scour is = 36.0
=====

you have entered wrong score values! please rewrite your actual scores!
```

Figure 14 An example of user with score less than 50

If the user's overall score is greater than 50 and less than 64: the system will show a message that there is no suitable major in our university and advise the user to try to get a higher overall score.

```
===== ACADEMIC DETAILS =====
What is your name ? Ahmed
write your High School GPA Score: 70
write your aptitude tests (Qudorat) Score: 50
write your scholastic achievement admission test (Tahsili) Score: 50
Your overall score is = 56.0
=====
There is no suitable major in the system for you in our university, try to have higher overall scores to study in our university *
=====
=
We hope that we have helped you, would you like to repeat the test or exit the system? 1 to continue
```

Figure 15 An example of user with score greater than 50 and less than 64

If the user overall score is equal to or greater than 64: there will be a list of the questions asked for the user of each major based on its overall score range and the system will ask the user questions on the majors that are compatible with the overall score and the user answers them with yes(1) or no(0). Then after the user finishes answering all the test questions, the result will display as a list of suitable majors for the user based on the market needs, their abilities, and its academic level in descending order (best suited - to worse suited).

```
===== ACADEMIC DETAILS =====
What is your name ? Walaa
write your High School GPA Score: 99.5
write your aptitude tests (Qudorat) Score: 89
write your scholastic achievement admission test (Tahsili) Score: 90
Your overall score is = 92.55
=====

===== START THE TEST =====
Are you assertive and confident in making decisions? 1
Can you deal with different personalities? 1
Do you take initiative in company growth? 1
Are you good in analyzing data and numbers? 1
Do you consider yourself a well-organized person? 1
Are you able to work under pressure efficiently while maintaining a positive attitude? 0
Do you respect people regardless of age, gender or marital status? 1
Do you have a great memory, and are you interested in science? 0
Are you open to criticism and dealing with clients? 1
Do you have a creative talent and an artistic way of thinking? 1
Are you open minded and willing to work outside from your comfort zone? 0
Do you have strong opinions about what you like and don't like in a particular field? 0
Are you interested in photography and film making? 0
Do you mentally rearrange the furniture every time you enter a new place? 1
Are you interested in the many decor styles? 1
Do you like working with forms, designs and patterns? 0
Are you interested in design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models? 1
Are you confident in your creativity? Do you like coming up with new ideas? 0
Do you like inventing and coming up with new solutions to existing or non-existing problems? 1
Are you willing to work with customers and new people every day? 0
Do you have an excellent sense of design? 1
Do you like to experiment with better and faster ways of doing things? 1
Are you patient and open to criticism? 0
Are you usually patient and good in working with a team? 0
Do you think creatively, critically or outside the box? 1
Do you have problem solving and high mathematical skills? 1
Do you have a good evaluation sense and analytical skills? 0
Are you interested in programming and solving technical problems? 1
Do you have problem-analysis skills with a logical reflection? 0
Are you overly observant and fast performing? 1
Do you have a patience and communication skills to work with the patient? 1
Do you have a good memory to deal with variety of diseases? 1
Do you have the ability to serve as a front-line educator? 0
Are interested to do a round with the doctors to the patient? 1
Are you ready to update your knowledge frequently in medicines and diseases? 0
Do you have the ability to work under stress? 1
Are you interested to learn about the security and hacking? 0
Do you have the problem solving skills? 0
Do you have the ability to work for long hours and often under pressure? 0
Can you tolerate anatomy sessions starting from animals to human beings? 0
Do you have analytical ability? 0

The best 'suitable major' for you is:
Business Administration
Interior Design
Industrial Design
Computer Science
Clinical Pharmacy

We hope that we have helped you, would you like to repeat the test or exit the system? 1 to continue
```

Figure 16 An example of user with equal to or greater than 64

Finally, after the result is shown to the user, the system asks the user if they want to take the test again, and the user will answer. **If the user types 1**, the system will ask the user about their academic details again and repeat the flow based on the overall score. Or **if the user types 0**, the system will end.

9. Comparison between two programming languages

Features for comparison

- **Part1:**

Table 3: Comparison between two programming languages - Features for comparison

Features	Python	Prolog
Syntax	<p>1. Variables declaration: a. <code>x=92</code></p> <p>2. If – else statement: a. <code>if x > y: print("x is greater than y")</code> b. <code>elif x == y: print("x and y are equal")</code></p> <p>3. Print statement: a. <code>print("Welcome To IAU")</code></p> <p>4. Functions: a. <code>def our_function(): print("inside function our_function")</code></p> <p>5. New Line: a. <code>print("Hello \n dear")</code></p> <p>6. Loops: a. <code>for x in ["first","second","third"]: print(x)</code></p>	<p>1. Variables declaration: a. Y (Capital letter)</p> <p>2. If – else statement: a. if statement: <code>(X < Y; write ('X is smaller than Y'))</code> b. if -else statement: <code>(A -> B; C)</code></p> <p>3. Print statement: a. <code>write('Welcome To IAU')</code></p> <p>4. Functions: a. <code>ourfunction:- write ('inside function ourfunction').</code></p> <p>5. New Line: a. <code>write ('Hello'), nl, ('dear')</code></p> <p>6. Loops: a. <code>(Example(_,X), write (X), true; false)</code></p>
Dependencies	Python and Prolog both languages are platform-independent, and that's mean they can run on any platform without recompiled.	
Paradigm	Python is multi-paradigm which supports procedural, functional, imperative, or object-oriented programming	Prolog is a logic paradigm that focuses on the relationship between the values of the data.

Memory Management	-Memory Manager controls memory allocation and de-allocation automatically in the backend. -Working of Garbage Collector.	-It has a memory manager. -Working of Garbage Collector and Stack shifter.
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- **Part 2:**

1- *Running the Program:*

This part compares how the system will start

- Python Code:

```
if __name__ == '__main__':
    print("*** WELCOME TO IAU MAJOR ADVISOR *** \n"
          "===== \n"
          "Hello dear. \n"
          "This is IAU Major Advisor, we will try to help choose the best major suitable for you in our university \n"
          "The major will be shown for you based on the market need in Saudi Arabia and based on your abilities that measured using \n"
          "the High school GPA score, your aptitude tests (Qudorat) score, your scholastic achievement admission test (Tahsili) score, and your hobbies. \n \n")
    select = int(input("Are you ready to provide your academic details"
                      "\n and start the test ? \n"
                      "Please enter 1 to start "
                      "\nor any other number to break the test \n "))
    suitableMajor = []
```

Figure 17 Running the System in python

- Prolog Code:

In the Prolog, you can use SWI-Prolog IDE

```
go:-
    write('      *** Welcom to IAU Major Advisor ***'),nl,nl,
    write('====='),nl,nl,
    write('Hello dear ♥'),nl,nl,
    write('This is IAU Major advisor, we will try to help you choose the best major suitable for you
          in our university'),nl,nl,
    write('The major will be shown for you based on the market need in saudi arabia and based on
          your abilities that measured using the High school GPA score, your aptitude tests (Qudorat)
          score, your scholastic achievement admission test (Tahsili) score, and your hobbies. '),nl,nl,
    nl,write('Are you ready to provide your academic details and start the test? Please enter 1 for
          true and 0 for false and if you enter any different result this will break your exam'),nl,
    read(S1),nl,S1==1,askDetails();write("thanks for visiting us and we would like to talk with you again ♥.").
```

Figure 18 Running the Program in prolog

- Comparison:

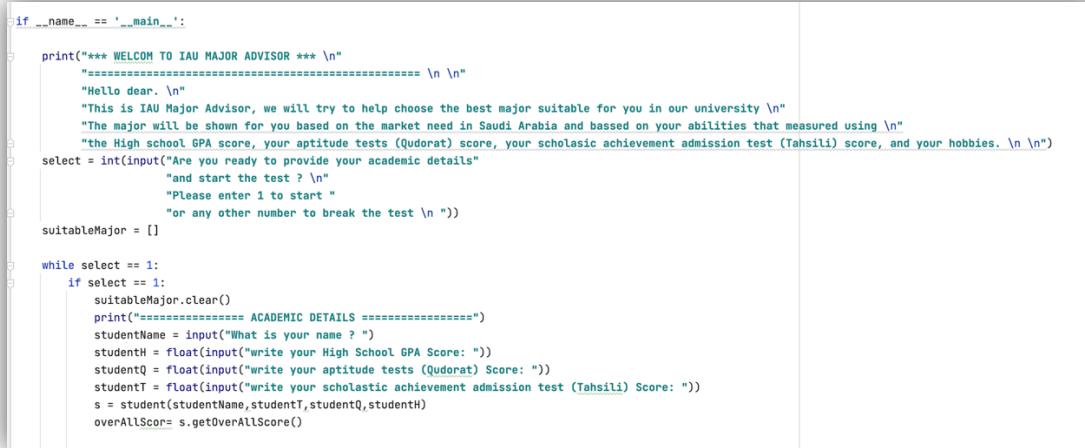
Table 4: Comparison between two programming languages - running the program

Python	Prolog
In the Python programming language, the user can run the system by using the PyCharm IDE, and it will start running from the main function that will call all the other system components (function, lists, ...etc). Note that no need to write anything to run the program as the IDE run button will take responsibility for that.	For the Prolog programming language, the user can run the system by using the online SWI-Prolog compiler or the SWI-Prolog Tool on your computer. However, in both running methods, the system runs by calling the go. function. Without typing go. , the system will not run. By running the go function, the system will starts to invoke other system components (facts, rules,..etc).

2- Ask About Details:

This section how the system in both languages will start asking about the academic details.

- *Python Code:*



```

if __name__ == '__main__':
    print("**** WELCOME TO IAU MAJOR ADVISOR *** \n"
          "===== \n"
          "Hello dear. \n"
          "This is IAU Major Advisor, we will try to help choose the best major suitable for you in our university \n"
          "The major will be shown for you based on the market need in Saudi Arabia and based on your abilities that measured using \n"
          "the High school GPA score, your aptitude tests (Qudarat) score, your scholastic achievement admission test (TAHSILI) score, and your hobbies. \n \n")
    select = int(input("Are you ready to provide your academic details"
                      "\n and start the test ? \n"
                      "Please enter 1 to start "
                      "\n or any other number to break the test \n "))
    suitableMajor = []

    while select == 1:
        if select == 1:
            suitableMajor.clear()
            print("===== ACADEMIC DETAILS =====")
            studentName = input("What is your name ? ")
            studentH = float(input("Write your High School GPA Score: "))
            studentQ = float(input("Write your aptitude tests (Qudarat) Score: "))
            studentT = float(input("Write your scholastic achievement admission test (TAHSILI) Score: "))
            s = student(studentName,studentT,studentQ,studentH)
            overAllScore= s.getOverAllScore()

```

Figure 19 Ask details in Python

- *Prolog Code:*

```

go:- 
    write('      *** Welcom to IAU Major Advisor ***'),nl,nl,
    write('====='),nl,nl,
    write('Hello dear *'),nl,nl,
    write('This is IAU Major advisor, we will try to help you choose the best major suitable for you
          in our university'),nl,nl,
    write('The major will be shown for you based on the market need in saudi arabia and based on
          your abilities that measured using the High school GPA score, your aptitude tests (Qudorat)
          score, your scholastic achievement admission test (Tahsili) score, and your hobbies. '),nl,nl,
    nl,write('Are you ready to provide your academic details and start the test? Please enter 1 for
          true and 0 for false and if you enter any different result this will break your exam'),nl,
    read(S1),nl,S1==1,askDetails();write("thanks for visiting us and we would like to talk with you again ❤️").
|_ /*Ask about the score and calculate the */
askDetails():-
    write(' ===== Academic Details ====='),nl,nl,
    write('What is your name?'),nl,
    read(_),nl,
    write('Write your High School GPA Score: '),nl,
    read(S1),nl,
    write('Write your aptitude tests (Qudorat) Score: '),nl,
    read(S2),nl,
    write('Write your scholastic achievement admission test (Tahsili) Score: '),nl,
    read(S3),nl,
    Y is (S1*0.3)+(S2*0.3)+(S3*0.4),
    write('Your overall score is= '),write(Y),nl,nl,
    Y>=50->
        score(Y);write('you have entered a wrong score values! please re write your accrual scores!'),nl,nl,askDetails().

```

Figure 20 Ask details in Prolog

- *Comparison:*

Table 5: Comparison between two programming languages - Ask details

Python	Prolog
After the user runs the system and answers the first question with 1, the getOverallScore() function will compute the student scores in the Academic Details section that defined under the menu section created by (while loop, and if-elif). Otherwise, it will print (thanks for visiting us and we would like to talk with you again ❤️).	After the go function starts running the system, it will call the askDetails() rule if the user typed 1 and getting the user data and calculating the scores, Otherwise, it will print (thanks for visiting us and we would like to talk with you again ❤️). Also, askDetails() rule is invoking another rule called score() to route the user into the right score range.
However, as you can see the difference between the two languages that Python uses (loops, control structures, and functions) with a menu to route the user to calculate the scores in the academic details section, while the Prolog is truly depending on the rules . After the user	

answering the question with yes, it will route him to rule to take the user data and calculating the scores, and this rule route the user to another rule to route the user into the right score range rather than using menus.

3- Route the score calculated to the right question:

- When the overall score is less than 50 or grater than 100:
 - *Python Code:*

```

while select == 1:
    if select == 1:
        suitableMajor.clear()
        print("===== ACADEMIC DETAILS =====")
        studentName = input("What is your name ? ")
        studentH = float(input("write your High School GPA Score: "))
        studentQ = float(input("write your aptitude tests (Qudarat) Score: "))
        studentT = float(input("write your scholastic achievement admission test (Tahsili) Score: "))
        s = student(studentName,studentT,studentQ,studentH)
        overAllScore= s.getOverAllScore()

        print("Your overall score is = ", overAllScore,
              "\n=====\\n")

        if (overAllScore < 50 or overAllScore > 100):
            print("you have entered wrong score values! please rewrite your actual scores!\n")
    
```

Figure 21: Route the score calculated to the right question in python

- *Prolog Code:*

```

/*Ask about the score and calculate the */
askDetails() :-
    write('===== Academic Details ====='),nl,nl,
    write('What is your name?'),nl,
    read(_),nl,
    write('Write your High School GPA Score: '),nl,
    read(S1),nl,
    write('Write your aptitude tests (Qudarat) Score: '),nl,
    read(S2),nl,
    write('Write your scholastic achievement admission test (Tahsili) Score: '),nl,
    read(S3),nl,
    Y is (S1*0.3)+(S2*0.3)+(S3*0.4),
    write('Your overall score is= '),write(Y),nl,nl,
    Y>=50->
    score(Y);write('you have entered a wrong score values! please re write your acrual scores!'),nl,nl,askDetails().
  
```

Figure 22: Route the score calculated to the right question in prolog

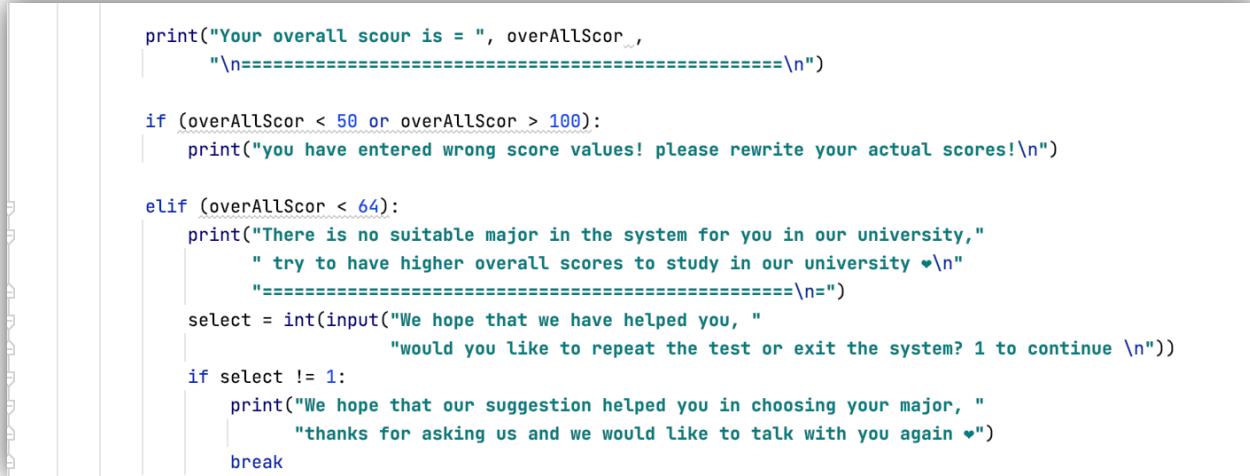
- *Comparison:*

Table 6: Comparison between two programming languages - Route the score calculated to the right question

Python	Prolog
In python, in the same menu of the academic details section, there will be a sub-menu created by control structures (if-elif) for validating the scores, and in the case when the overall score is less than 50 or grater than 100 it will print (you have entered wrong values! Please rewrite your actual scores!) and will ask him about the academic details again science there is no break keyword to stop the loop in this menu item . Otherwise it will continue to the next item in the if-elif menu.	Since the Prolog is truly depending on the rules, so when the user in the Academic details rules and the system finishing of its overall score, and its score is less than 50 it will directly print (you have entered wrong values! Please rewrite your actual scores!) message for him and call the askDetails() rule again , otherwise it will route him to the score() rule .
As you can see even that the system is doing the same functionality, but since the structure of Python and Prolog is different, then the system components to do the same function may be written in different places to work well.	

➤ **when the overall score is less than 64:**

- *Python Code:*



```

print("Your overall score is = ", overAllScore,
      "\n=====\\n=====")

if (overAllScore < 50 or overAllScore > 100):
    print("you have entered wrong score values! please rewrite your actual scores!\\n")

elif (overAllScore < 64):
    print("There is no suitable major in the system for you in our university,"
          " try to have higher overall scores to study in our university ♥\\n"
          "=====\\n=====")
    select = int(input("We hope that we have helped you, "
                      "would you like to repeat the test or exit the system? 1 to continue \\n"))
    if select != 1:
        print("We hope that our suggestion helped you in choosing your major, "
              "thanks for asking us and we would like to talk with you again ♥")
        break

```

Figure 23: overall score is less than 64 in python

- *Prolog Code:*

```

/*route the score calculated to the right question*/
score(X):-  

X>=92-> calc92(T9,T8,T7,T6,T5,T4,T3,T2,T1,T)->writeln('====='),  

nl,nl->writeln('If you did not find any valid majors means nothing fits you in our university *□*'),  

nl->writeln('The best suitable major for you is :')->writeln(T9)->writeln(T8)->writeln(T7)->writeln(T6)->  

writeln(T5)->writeln(T4)->writeln(T3)->writeln(T2)->writeln(T1)->writeln(T)->ask();  

X>=85-> calc85(T8,T7,T6,T5,T4,T3,T2,T1,T)->writeln('====='),  

nl,nl->writeln('If you did not find any valid majors means nothing fits you in our university *□*'),  

nl->writeln('The best suitable major for you is :')->writeln(T8)->writeln(T7)->writeln(T6)->writeln(T5)->  

writeln(T4)->writeln(T3)->writeln(T2)->writeln(T1)->writeln(T)->ask();  

X>=84-> calc84(T1,T4,T3,T2,T)->writeln('====='),  

nl,nl->writeln('If you did not find any valid majors means nothing fits you in our university *□*'),nl  

->writeln('The best suitable major for you is :')->writeln(T1)->writeln(T4)->writeln(T3)->writeln(T2)->writeln(T)->ask();  

X>=79-> calc79(T1,T)->writeln('====='),  

nl,nl->writeln('If you did not find any valid majors means nothing fits you in our university *□*'),  

nl->writeln('The best suitable major for you is :')->writeln(T1)->writeln(T)->ask();  

X>=64-> calc64(T),writeln('====='),  

nl,nl->writeln('If you did not find any valid majors means nothing fits you in our university *□*'),  

nl->print('The best suitable major for you is :')->writeln(T)->ask();  

X<64 -> writeln('====='),  

nl,nl->write('There is no suitable major in the system for you in our university *□*,')  

try to have higher overall scores to study in our university ♥)->ask().

```

Figure 24: overall score is less than 64 in prolog

- *Comparison:*

Table 7: overall score is less than 64 comparison

Python	Prolog
<p>In python, as we said before, you can directly do the minus using the (if-elif) control structures, so in it will catch in the sub menu item 2 when the overall score is less than 64, and this case has used the if-condition control structure to ask the user if he wants to repeat the test or not, the repeating operation will run if the user typed 1, otherwise the system will stop running by using the break keyword inside the second if-condition control structure.</p>	<p>After calculating the overall score, and it is higher than 50, it will be routed to the score() rule science the Prolog truly depends on the rules, and inside the rule we have the option to simulate the menu, that is why we simulate the menu of validating scores using the if-else statement inside score() rule, and it will catch the case of X<64 and print (there is no suitable major in the system for you in our university..etc) message to the user, then route it to ask()</p>

rule to ask the user for repeating the test or not.

As you can see even that the system is doing the same functionality, but since the structure of Python and Prolog is different, then the system components to do the same function may be written in different places to work well.

- when the overall score is greater than or equal 64 and less than 79, and start asking about the Business majors.

- *Python Code:*

```
elif (overAllScor >= 64 and overAllScor < 79):
    startTest()
    Business()
    print("\nThe best 'suitable major' for you is: ")
    PrintSuitableMajor(suitableMajor)
    select = int(input("We hope that we have helped you, "
                      "would you like to repeat the test or exit the system? 1 to continue \n"))
    if select != 1:
        print("We hope that our suggestion helped you in choosing your major, "
              "thanks for asking us and we would like to talk with you again ♥")
    break
```

Figure 25 When the overall score is greater than or equal 64 and less than 79 in python

- *Prolog Code:*

```

/*Questions of & 64*/
calc64(T):-
    write('===== Start The Test ====='),nl,nl,
    write('Are you assertive and confident in making decisions? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam'),nl,
    read(L),nl,
    write("Can you deal with different personalities? Please enter 1 for true and 0 for false and if you enter
        any different result this will break your exam"),nl,
    read(L1),nl,
    write("Do you take initiative in company growth? Please enter 1 for true and 0 for false and if you enter any different
        result this will break your exam"),nl,read(L2),nl,
    bisQuestions(L,L1,L2,T).

```

Figure 26 When the overall score is greater than or equal 64 and less than 79 in Prolog

- Comparison:

Table 8: overall score is greater than or equal 64 and less than 79 comparison

Python	Prolog
In case if the user overall score is greater than or equal 64 and less than 79 , then the case will catch the third item condition in the sub menu and will call the startTest() function, and the Business() questions function to ask about the business questions as it is the only major available within this scores range.	In the Prolog, when the overall score is greater than or equal 64 and less than 79 , the overall score will catch the X>=64 condition in the score() rule, and this will lead the user to calc64() rule to start ask about the majors question under this score range, it will ask about the first 3 business questions and passes the user answers values to bisQuestions() rule to complete the operation.
As you can see even that the system is doing the same functionality, but since the structure of Python and Prolog is different, then the system components to do the same function may be written in different places to work well.	

- when the overall score is greater than or equal 79 and less than 84, and start asking about the majors.
 - Python Code:

```

    elif (overAllScor >= 79 and overAllScor < 84):
        startTest()
        Business()
        Nursing()
        print("\nThe best 'suitable major' for you is: ")
        PrintSuitableMajor(suitableMajor)
        select = int(input("We hope that we have helped you, "
                           "would you like to repeat the test or exit the system? 1 to continue \n"))
        if select != 1:
            print("We hope that our suggestion helped you in choosing your major, "
                  "thanks for asking us and we would like to talk with you again ♥")
            break

```

Figure 27 when the overall score is greater than or equal 79 and less than 84 in python

- *Prolog Code:*

```

/*Questions of $ 79*/
calc79(T1,T):-
    calc64(T)->n1-> write('Are you able to work under pressure efficiently while maintaining a positive attitude?
                                Please enter 1 for true and 0 for false and if you enter any different result this will
                                break your exam'),n1,read(L3),n1,
    write('Do you respect people regardless of age or gender or marital status? Please enter 1 for true and 0 for false
          and if you enter any different result this will break your exam'),n1,
    read(L4),n1,write('Do you have a great memory or are you interested in science? Please enter 1 for
                      true and 0 for false and if you enter any different result this will break your exam'),n1,
    read(L5),n1,nQuestions(L3,L4,L5,T1).

```

Figure 28 When the overall score is greater than or equal 79 and less than 84 in Prolog

- *Comparison:*

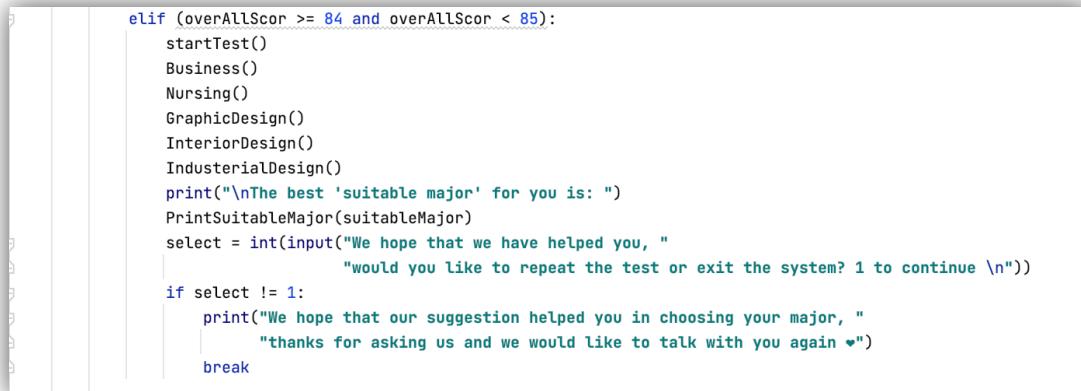
Table 9: overall score is greater than or equal 79 and less than 84 comparison

Python	Prolog
In case if the user overall score is greater than or equal 79 and less than 84 , then the case will catch the third item condition in the sub menu and will call the <i>startTest()</i> function, and the <i>Business()</i> questions function and <i>Nursing()</i> questions function to ask the user about those majors within this scores range.	In the Prolog, when the overall score is greater than or equal 79 and less than 84 , the overall score will catch the X>=79 condition in the <i>score()</i> rule, and this will lead the user to <i>calc79()</i> rule to start ask about the majors question under this score range. This rule will invoke the <i>calc64()</i> rule as the majors in 64 range fits the 79 range. Then, it will ask about the first 3

	questions from the Nursing questions and passes the user answers values to nQuestions() rule to complete the operation.
	As you can see even that the system is doing the same functionality, but since the structure of Python and Prolog is different, then the system components to do the same function may be written in different places to work well.

- when the overall score is greater than or equal 84 and less than 85, and start asking about the majors.

- *Python Code:*



```

elif (overallScore >= 84 and overallScore < 85):
    startTest()
    Business()
    Nursing()
    GraphicDesign()
    InteriorDesign()
    IndustrialDesign()
    print("\nThe best 'suitable major' for you is: ")
    PrintSuitableMajor(suitableMajor)
    select = int(input("We hope that we have helped you, "
                      "would you like to repeat the test or exit the system? 1 to continue \n"))
    if select != 1:
        print("We hope that our suggestion helped you in choosing your major, "
              "thanks for asking us and we would like to talk with you again ♥")
        break

```

Figure 29- When the overall score is greater than or equal 84 and less than 85 in Python

- *Prolog Code:*

```

/*Questions of > 84*/
calc84(T1,T4,T3,T2,T):-
    calc79(T1,T)->
        write("Do you like inventing and coming up with new solutions to existing or non-existing problems?
            Please enter 1 for true and 0 for false and if you enter any different result this will break
            your exam"),nl,
        read(L),nl,
        write("Are you willing to work with customers and new people every day? Please enter 1 for true and
            0 for false and if you enter any different result this will break your exam"),nl,
        read(L1),nl,
        write("Do you have an excellent sense of design? Please enter 1 for true and 0 for false and if you
            enter any different result this will break your exam"),nl,
        read(L2),nl,isdQuestions(L,L1,L2,T4),nl,
        write("Do you mentally rearrange the furniture every time you enter a new place? Please enter 1
            for true and 0 for false and if you enter any different result this will break your exam"),nl,
        read(L4),nl,
        write("Are you interested in the many decor styles? Please enter 1 for true and 0 for false and if
            you enter any different result this will break your exam"),nl,
        read(L5),nl,
        write("Do you like working with forms, designs and patterns? Please enter 1 for true and 0 for false
            and if you enter any different result this will break your exam"),nl,
        read(L6),nl,indQuestions(L4,L5,L6,T3),nl,
        write("Are you open to criticism and dealing with clients? Please enter 1 for true and 0 for false and
            if you enter any different result this will break your exam"),nl,
        read(L7),nl,
        write("Do you have a creative talent and an artistic way of thinking? Please enter 1 for true and 0 for
            false and if you enter any different result this will break your exam"),nl,
        read(L8),nl,
        write("Are you open minded and willing to work outside from your comfort zone? Please enter 1 for true and
            0 for false and if you enter any different result this will break your exam"),nl,
        read(L9),nl,
        gdQuestions(L7,L8,L9,T2).

```

Figure 30 - When the overall score is greater than or equal 84 and less than 85 in Prolog

- *Comparison:*

Table 10: overall score is greater than or equal 84 and less than 85 comparison

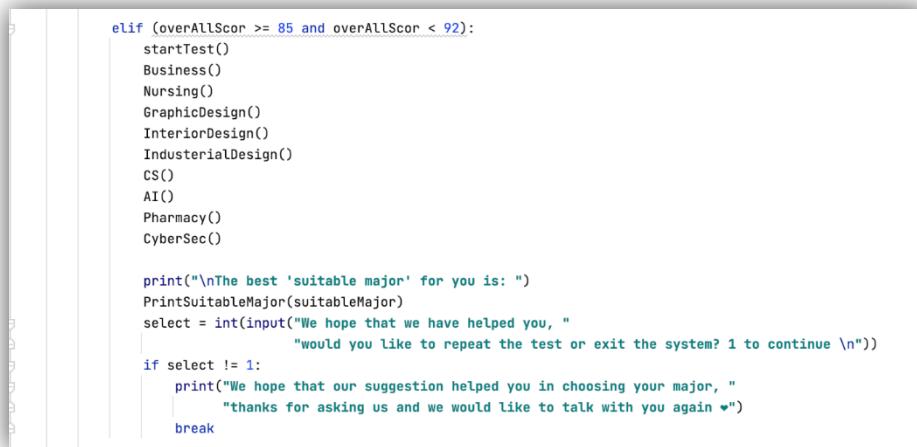
Python	Prolog
<p>In case if the user overall score is greater than or equal 84 and less than 85, then the case will catch the third item condition in the sub menu and will call the <i>startTest()</i> function, and the <i>Business()</i>, <i>Nursing()</i>, <i>GraphicDesign()</i>, <i>InteriorDesign()</i>, and <i>IndustrialDesign()</i> questions functions to ask the user about those majors within this scores range.</p>	<p>In the Prolog, when the overall score is greater than or equal 84 and less than 85, the overall score will catch the X>=84 condition in the <i>score()</i> rule, and this will lead the user to <i>calc84()</i> rule to start ask about the majors question under this score range. This rule will invoke the <i>calc79()</i> rule as the majors in 79 range fits the 84 range. Then, it will ask about the first 3 questions from the Interior Design, Industrial Design, and Graphic Design</p>

questions and passes the user answers values to *isQuestions()* rule, *indQuestions()* rule, and *gdQuestions()* rule respectively to complete the operation.

As you can see even that the system is doing the same functionality, but since the structure of Python and Prolog is different, then the system components to do the same function may be written in different places to work well.

- When the overall score is greater than or equal 85 and less than 92, and start asking about the majors.

- *Python Code:*



```

elif (overAllScor >= 85 and overAllScor < 92):
    startTest()
    Business()
    Nursing()
    GraphicDesign()
    InteriorDesign()
    IndustrialDesign()
    CS()
    AI()
    Pharmacy()
    CyberSec()

    print("\nThe best 'suitable major' for you is: ")
    PrintSuitableMajor(suitableMajor)
    select = int(input("We hope that we have helped you, "
                      "would you like to repeat the test or exit the system? 1 to continue \n"))
    if select != 1:
        print("We hope that our suggestion helped you in choosing your major, "
              "thanks for asking us and we would like to talk with you again ^")
        break

```

Figure 31 □ When the overall score is greater than or equal 85 and less than 92 in Python

- *Prolog Code:*

```

/*Questions of & 85*/
calc85(T8,T1,T7,T6,T5,T4,T3,T2,T):-
    calc84(T1,T4,T3,T2,T),
    write("Are you usually patient and good in working with a team?
        Please enter 1 for true and 0 for false and if you enter any different result this will break your exam"),nl,
    read(L13),nl,
    write("Do you think creatively, critically or outside the box? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam"),nl,
    read(L14),nl,
    write("Do you have problem solving and high mathematical skills? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam"),nl,
    read(L15),nl,csquestions(L13,L14,L15,T5),nl,
    write("Do you have problem-analysis skills with a logical reflection? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam"),nl,
    read(L16),nl,
    write("Can you deal with different personalities? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam"),nl,
    read(L17),nl,
    write("Are you overly observant and fast performing? Please enter 1 for true and 0 for false and if you
        enter any different result this will break your exam"),nl,
    read(L18),nl,aiquestions(L10,L11,L12,T7),nl,
    write("Do you have a patience and communication skills to work with the patient?
        Please enter 1 for true and 0 for false and if you enter any different result this will break your exam"),nl,
    read(L19),nl,
    write("Do you have a good memory to deal with variety of diseases? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam"),nl,read(L17),nl,
    write("Do you have the ability to serve as a front-line educator? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam"),nl,read(L18),nl,
    cpquestions(L18,L17,L16,T8),nl,
    write("Do you have the ability of working under stress? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam"),nl,read(L19),nl,
    write("Are you interested to learn about the security and hacking? Please enter 1 for true
        and 0 for false and if you enter any different result this will break your exam"),nl,
    read(L20),nl,
    write("Do you have the problem-solving skills? Please enter 1 for true and 0 for false and if you enter
        any different result this will break your exam"),nl,
    read(L21),nl,cyQuestions(L19,L20,L21,T6).

```

Figure 32 When the overall score is greater than or equal 85 and less than 92 in Prolog

- *Comparison:*

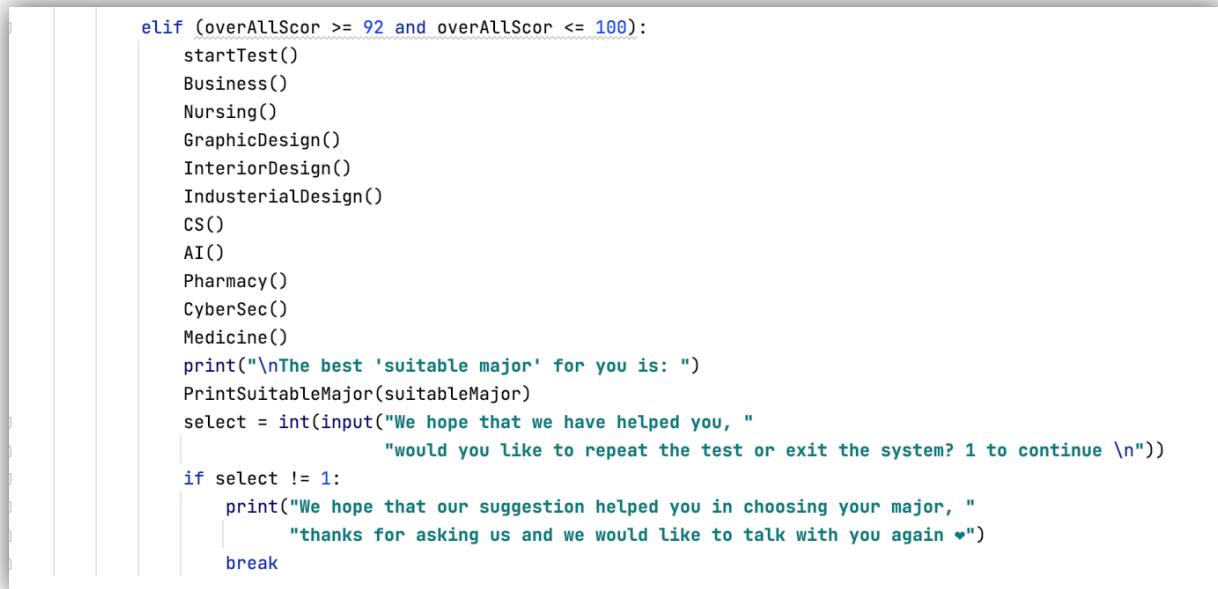
Table 11: overall score is greater than or equal 85 and less than 92 comparison

Python	Prolog
<p>In case if the user overall score is greater than or equal 85 and less than 92, then the case will catch the third item condition in the sub menu and will call the <i>startTest()</i> function, and the <i>Business()</i>, <i>Nursing()</i>, <i>GraphicDesign()</i>, <i>InteriorDesign()</i>, and <i>IndustrialDesign()</i>, <i>CS()</i>, <i>AI()</i>, <i>Pharmacy()</i>, and <i>CyberSec()</i> questions functions to ask the user about those majors within this scores range.</p>	<p>In the Prolog, when the overall score is greater than or equal 85 and less than 92, the overall score will catch the X>=85 condition in the <i>score()</i> rule, and this will lead the user to <i>calc85()</i> rule to start ask about the majors question under this score range. This rule will invoke the <i>calc84()</i> rule as the majors in 84 range fits the 85 range. Then, it will ask about the first 3 questions from the Computer Sciences, Artificial Intelligence , Clinical Pharmacy, and Cyber Security questions and passes the</p>

	user answers values to <i>csQuestions()</i> rule, <i>aiQuestions()</i> rule, <i>cpQuestions()</i> rule ,and <i>cyQuestions()</i> rule respectively to complete the operation.
	As you can see even that the system is doing the same functionality, but since the structure of Python and Prolog is different, then the system components to do the same function may be written in different places to work well.

- when the overall score is greater than or equal 92 and less or equal than 100, and start asking about the majors.

- *Python Code:*



```

elif (overAllScor >= 92 and overAllScor <= 100):
    startTest()
    Business()
    Nursing()
    GraphicDesign()
    InteriorDesign()
    IndusterialDesign()
    CS()
    AI()
    Pharmacy()
    CyberSec()
    Medicine()
    print("\nThe best 'suitable major' for you is: ")
    PrintSuitableMajor(suitableMajor)
    select = int(input("We hope that we have helped you, "
                      "would you like to repeat the test or exit the system? 1 to continue \n"))
    if select != 1:
        print("We hope that our suggestion helped you in choosing your major, "
              "thanks for asking us and we would like to talk with you again ♥")
        break

```

Figure 33: when the overall score is greater than or equal 92 and less than or equal 100 in python

- *Prolog Code:*

```

/*Questions of &gt; 92*/
calc92(T9,T8,T7,T6,T5,T4,T3,T2,T1,T):-  

    calc85(T8,T1,T7,T6,T5,T4,T3,T2,T),  

    write("Do you have the ability to work for long hours and often under pressure?  

        Please enter 1 for true and 0 for false and if you enter any different result this will break your exam"),nl,  

    read(L),nl,  

    write("Can you tolerate anatomy sessions starting from animals to human beings?  

        Please enter 1 for true and 0 for false and if you enter any different result this will break your exam"),nl,  

    read(L1),nl,  

    write("Do you have analytical ability? Please enter 1 for true and 0 for false and if you enter any different  

        result this will break your exam"),nl,read(L2),nl,medQuestions(L,L1,L2,T9).

```

Figure 34: when the overall score is greater than or equal 92 and less than or equal 100 in prolog

- Comparison:

Table 12: overall score is greater than or equal 92 and less than or equal 100 comparison

Python	Prolog
In case if the user overall score is greater than or equal 92 and less than 100 , then the case will catch the third item condition in the sub menu and will call the <i>startTest()</i> function, and the <i>Business()</i> , <i>Nursing()</i> , <i>GraphicDesign()</i> , <i>InteriorDesign()</i> , and <i>IndustrialDesign()</i> , <i>CS()</i> , <i>AI()</i> , <i>Pharmacy()</i> , <i>CyberSec()</i> and <i>Medicince()</i> questions functions to ask the user about those majors within this scores range.	In the Prolog, when the overall score is greater than or equal 92 and less than 100 , the overall score will catch the X>=92 condition in the <i>score()</i> rule, and this will lead the user to <i>calc92()</i> rule to start ask about the majors question under this score range. This rule will invoke the <i>calc85()</i> rule as the majors in 85 range fits the 92 range. Then, it will ask about the first 3 questions from the Medicine questions and passes the user answers values to <i>medQuestions()</i> rule to complete the operation.
As you can see even that the system is doing the same functionality, but since the structure of Python and Prolog is different, then the system components to do the same function may be written in different places to work well.	

4- Majors Questions Functions:

- Python Code:

```
def Business():
    BUSquestion=["Are you assertive and confident in making decisions?",
                 "Can you deal with different personalities?",
                 "Do you take initiative in company growth?",
                 "Are you good in analyzing data and numbers?",
                 "Do you consider yourself a well-organized person?"]
    counter=0
    for i in BUSquestion:
        answer=int(input(i))
        if (answer==1):
            counter += 1
        if (i==BUSquestion[2] and counter < 2):
            break
    if (counter >= 3):
        suitableMajor.append("Business Administration")

def Nursing():
    NURquestion = ["Are you able to work under pressure efficiently while maintaining a positive attitude?",
                   "Do you respect people regardless of age, gender or marital status?",
                   "Do you have a great memory, and are you interested in science?",
                   "Are you patient, active, and do you love to work with children?",
                   "Are you interested in working with patients, and do you have a strong sense of responsibility and sound judgment?"]
    counter = 0
    for i in NURquestion:
        answer = int(input(i))
        if (answer == 1):
            counter += 1
        if (i == NURquestion[2] and counter < 2):
            break
    if (counter >= 3):
        suitableMajor.append("Nursing")
```

Figure 35 Majors Questions Functions in Python – part 1

```

def GraphicDesign():
    GDquestion = ["Are you open to criticism and dealing with clients? ",
                  "Do you have a creative talent and an artistic way of thinking?",
                  "Are you open minded and willing to work outside from your comfort zone?",
                  "Do you have strong opinions about what you like and don't like in a particular field? ",
                  "Are you interested in photography and film making?"]
    counter = 0
    for i in GDquestion:
        answer = int(input(i))
        if (answer == 1):
            counter += 1
        if (i == GDquestion[2] and counter < 2):
            break
    if (counter >= 3):
        suitableMajor.append("Graphic Design")

def InteriorDesign():
    IntDquestion = ["Do you mentally rearrange the furniture every time you enter a new place? ",
                    "Are you interested in the many decor styles?",
                    "Do you like working with forms, designs and patterns?",
                    "Are you interested in design techniques, tools, and principles involved in production of precision technical plans, blueprints, drawings, and models? ",
                    "Are you confident in your creativity? Do you like coming up with new ideas?"]
    counter = 0
    for i in IntDquestion:
        answer = int(input(i))
        if (answer == 1):
            counter += 1
        if (i == IntDquestion[2] and counter < 2):
            break
    if (counter >= 3):
        suitableMajor.append("Interior Design")

```

Figure 36 Majors Questions Functions in Python – part 2

```

def IndustrialDesign():
    InduQuestion = ["Do you like inventing and coming up with new solutions to existing or non-existing problems? ",
                   "Are you willing to work with customers and new people every day?",
                   "Do you have an excellent sense of design?",
                   "Do you like to experiment with better and faster ways of doing things?",
                   "Are you patient and open to criticism?"]
    counter = 0
    for i in InduQuestion:
        answer = int(input(i))
        if (answer == 1):
            counter += 1
        if (i == InduQuestion[2] and counter < 2):
            break
    if (counter >= 3):
        suitableMajor.append("Industrial Design")

def CS():
    CSquestion = ["Are you usually patient and good in working with a team?",
                  "Do you think creatively, critically or outside the box? ",
                  "Do you have problem solving and high mathematical skills?",
                  "Do you have a good evaluation sense and analytical skills? ",
                  "Are you interested in programming and solving technical problems?"]
    counter = 0
    for i in CSquestion:
        answer = int(input(i))
        if (answer == 1):
            counter += 1
        if (i == CSquestion[2] and counter < 2):
            break
    if (counter >= 3):
        suitableMajor.append("Computer Science")

```

Figure 37 Majors Questions Functions in Python – part 3

```
def AI():
    AIquestion = ["Do you have problem-analysis skills with a logical reflection?",
                  "Do you have a solid mathematical and statistical background? ",
                  "Are you overly observant and fast performing? ",
                  "Do you like to develop yourself and abreast of all technological developments around you? ",
                  "Do you have an interest in artificial intelligence and machine learning?"]
    counter = 0
    for i in AIquestion:
        answer = int(input(i))
        if (answer == 1):
            counter += 1
        if (i == AIquestion[2] and counter < 2):
            break
    if (counter >= 3):
        suitableMajor.append("Artificial Intelligence")

def CyberSec():
    AIquestion = ["Do you have the ability to work under stress? ",
                  "Are you interested to learn about the security and hacking? ",
                  "Do you have the problem solving skills? ",
                  "Are you passionate about computer forensics? ",
                  "Do you pay attention to details? "]
    counter = 0
    for i in AIquestion:
        answer = int(input(i))
        if (answer == 1):
            counter += 1
        if (i == AIquestion[2] and counter < 2):
            break
    if (counter >= 3):
        suitableMajor.append("Cyber Security ")
```

Figure 38 Majors Questions Functions in Python – part 4

```

def Pharmacy():
    Pharmquestion = ["Do you have a patience and communication skills to work with the patient?",
                     "Do you have a good memory to deal with variety of diseases?",
                     "Do you have the ability to serve as a front-line educator?",
                     "Are interested to do a round with the doctors to the patient?",
                     "Are you ready to update your knowledge frequently in medicines and diseases?"]
    counter = 0
    for i in Pharmquestion:
        answer = int(input(i))
        if (answer == 1):
            counter += 1
        if (i == Pharmquestion[2] and counter < 2):
            break
    if (counter >= 3):
        suitableMajor.append("Clinical Pharmacy")

def Medicine():
    MIDquestion = ["Do you have the ability to work for long hours and often under pressure?",
                   "Can you tolerate anatomy sessions starting from animals to human beings?",
                   "Do you have analytical ability?",
                   "Do you have the ability to promote health education?",
                   "Do you have good practical skills?"]
    counter = 0
    for i in MIDquestion:
        answer = int(input(i))
        if (answer == 1):
            counter += 1
        if (i == MIDquestion[2] and counter < 2):
            break
    if (counter >= 3):
        suitableMajor.append("Medicine")

```

Figure 39 Majors Questions Functions in Python – part 5

```

def PrintSuitableMajor(suitableMajor):
    for i in suitableMajor:
        print("    "+i)

```

Figure 40 Printing result of suitable Majors

- *Prolog Code:*

```

cyQuestions(L,L1,L2,T):-
    ( L\==1-> L1\==1-> L2\==1),result((0,L,L1,L2,0,0),T);
    ( L\==1-> L1\==1-> L2==1),result((0,L,L1,L2,0,0),T);
    ( L\==1-> L1==1-> L2\==1),result((0,L,L1,L2,0,0),T);
    ( L\==1-> L1==1-> L2==1),write("Are you passionate about computer forensics? Please enter 1
                                                for true and 0 for false and if you enter any different result this will break your exam"),nl,
    read(SW1),nl,
    write("Do you pay attention to details? Please enter 1 for true and 0 for false and if you enter any different result this will
          break your exam"),nl,
    read(SW2),nl,result((0,L,L1,L2,SW1,SW2),T);
    ( L==1-> L1\==1-> L2\==1),result((0,L,L1,L2,0,0),T);
    ( L==1-> L1\==1-> L2==1),write("Are you passionate about computer forensics? Please enter 1 for true and 0 for false and if
                                                you enter any different result this will break your exam"),nl,
    read(SW1),nl,write("Do you pay attention to details? Please enter 1 for true and 0 for false and if you enter any different result
          this will break your exam"),nl,
    read(SW2),nl,
    result((0,L,L1,L2,SW1,SW2),T);
    ( L==1-> L1==1-> L2\==1),write("Are you passionate about computer forensics? Please enter 1 for true and 0 for false and if you
                                                enter any different result this will break your exam"),nl,
    read(SW1),nl,write("Do you pay attention to details? Please enter 1 for true and 0 for false and if you enter any different result
          this will break your exam"),nl,
    read(SW2),nl,result((0,L,L1,L2,SW1,SW2),T);
    ( L==1-> L1==1-> L2==1),write("Are you passionate about computer forensics? Please enter 1 for true and 0 for false and if you
                                                enter any different result this will break your exam"),nl,
    read(SW1),nl,write("Do you pay attention to details? Please enter 1 for true and 0 for false and if you enter any different result
          this will break your exam"),nl,
    read(SW2),nl,
    result((0,L,L1,L2,SW1,SW2),T).

```

Figure 41 Majors Questions Functions in Prolog – part 1

```

cpQuestions(L,L1,L2,T):-
    ( L\==1-> L1\==1-> L2\==1),result((1,L,L1,L2,0,0),T);
    ( L\==1-> L1\==1-> L2==1),result((1,L,L1,L2,0,0),T);
    ( L\==1-> L1==1-> L2\==1),result((1,L,L1,L2,0,0),T);
    ( L\==1-> L1==1-> L2==1),write("Are interested to do a round with the doctors to the patient? Please enter 1
                                                for true and 0 for false and if you enter any different result this will break your exam"),nl,
    read(SQ1),nl,
    write("Are you ready to update your knowledge frequently in medicines and diseases? Please enter 1 for true and 0 for
          false and if you enter any different result this will break your exam"),nl,
    read(SQ2),nl,
    result((1,L,L1,L2,SQ1,SQ2),T);
    ( L==1-> L1\==1-> L2\==1),result((1,L,L1,L2,0,0),T);
    ( L==1-> L1\==1-> L2==1),write("Are interested to do a round with the doctors to the patient? Please enter 1 for true and 0 for
                                                false and if you enter any different result this will break your exam"),nl,
    read(SQ1),nl,write("Are you ready to update your knowledge frequently in medicines and diseases? Please enter 1 for true and 0 for false and if
          you enter any different result this will break your exam"),nl,
    read(SQ2),nl,result((1,L,L1,L2,SQ1,SQ2),T);
    ( L==1-> L1==1-> L2\==1),write("Are interested to do a round with the doctors to the patient? Please enter 1 for true and 0 for
                                                false and if you enter any different result this will break your exam"),nl,
    read(SQ1),nl,write("Are you ready to update your knowledge frequently in medicines and diseases? Please enter 1 for true and 0 for false and if
          you enter any different result this will break your exam"),nl,
    read(SQ2),nl,result((1,L,L1,L2,SQ1,SQ2),T);
    ( L==1-> L1==1-> L2==1),write("Are interested to do a round with the doctors to the patient? Please enter 1 for true and 0 for
                                                false and if you enter any different result this will break your exam"),nl,
    read(SQ1),nl,write("Are you ready to update your knowledge frequently in medicines and diseases? Please enter 1 for true and 0 for false and if
          you enter any different result this will break your exam"),nl,
    read(SQ2),nl,result((1,L,L1,L2,SQ1,SQ2),T).

```

Packed string (SW17
for a list of codes)

Figure 42 Majors Questions Functions in Prolog – part 2

```

csQuestions(L,L1,L2,T):-
    ( L\==1->L1\==1->L2\==1),result((3,L,L1,L2,0,0),T);
    ( L\==1->L1\==1->L2==1),result((3,L,L1,L2,0,0),T);
    ( L\==1->L1==1->L2\==1),result((3,L,L1,L2,0,0),T);
    ( L\==1->L1==1->L2==1),write("Do you have a good evaluation sense and analytical skills? Please enter 1 for true and 0 for
        false and if you enter any different result this will break your exam"),nl,
    read(SO1),nl,write("Are you interested in programming and solving technical problems? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam"),nl,
    read(SO2),nl,result((3,L,L1,L2,SO1,SO2),T);
    ( L==1->L1\==1->L2\==1),result((3,L,L1,L2,0,0),T);
    ( L==1->L1\==1->L2==1),write("Do you have a good evaluation sense and analytical skills? Please enter 1 for true and 0 for
        false and if you enter any different result this will break your exam"),nl,
    read(SO1),nl,write("Are you interested in programming and solving technical problems? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam"),nl,
    read(SO2),nl,result((3,L,L1,L2,SO1,SO2),T);
    ( L==1->L1\==1->L2\==1),write("Do you have a good evaluation sense and analytical skills? Please enter 1 for true and 0 for
        false and if you enter any different result this will break your exam"),nl,
    read(SO1),nl,write("Are you interested in programming and solving technical problems? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam"),nl,
    read(SO2),nl,result((3,L,L1,L2,SO1,SO2),T);
    ( L==1->L1\==1->L2==1),write("Do you have a good evaluation sense and analytical skills? Please enter 1 for true and 0 for
        false and if you enter any different result this will break your exam"),nl,
    read(SO1),nl,write("Are you interested in programming and solving technical problems? Please enter 1 for true and 0 for false
        and if you enter any different result this will break your exam"),nl,
    read(SO2),nl,result((3,L,L1,L2,SO1,SO2),T).

```

Figure 43 Majors Questions Functions in Prolog – part 3

```

cpQuestions(L,L1,L2,T):-
    ( L\==1-> L1\==1-> L2\==1),result((1,L,L1,L2,0,0),T);
    ( L\==1-> L1\==1-> L2==1),result((1,L,L1,L2,0,0),T);
    ( L\==1-> L1==1-> L2\==1),result((1,L,L1,L2,0,0),T);
    ( L\==1-> L1==1-> L2==1),write("Are interested to do a round with the doctors to the patient? Please enter 1
        for true and 0 for false and if you enter any different result this will break your exam"),nl,
    read(SQ1),nl,
    write("Are you ready to update your knowledge frequently in medicines and diseases? Please enter 1 for true and 0 for
        false and if you enter any different result this will break your exam"),nl,
    read(SQ2),nl,
    result((1,L,L1,L2,SQ1,SQ2),T);
    ( L==1-> L1\==1-> L2\==1),result((1,L,L1,L2,0,0),T);
    ( L==1-> L1\==1-> L2==1),write("Are interested to do a round with the doctors to the patient? Please enter 1 for true and 0 for
        false and if you enter any different result this will break your exam"),nl,
    read(SQ1),nl,
    write("Are you ready to update your knowledge frequently in medicines and diseases? Please enter 1 for true and 0 for false and if
        you enter any different result this will break your exam"),nl,
    read(SQ2),nl,result((1,L,L1,L2,SQ1,SQ2),T);
    ( L==1-> L1\==1-> L2\==1),write("Are interested to do a round with the doctors to the patient? Please enter 1 for true and 0 for
        false and if you enter any different result this will break your exam"),nl,
    read(SQ1),nl,write("Are you ready to update your knowledge frequently in medicines and diseases? Please enter 1 for true and 0 for
        false and if you enter any different result this will break your exam"),nl,
    read(SQ2),nl,result((1,L,L1,L2,SQ1,SQ2),T);
    ( L==1-> L1\==1-> L2==1),write("Are interested to do a round with the doctors to the patient? Please enter 1 for true and 0
        for false and if you enter any different result this will break your exam"),nl,
    read(SQ1),nl,write("Are you ready to update your knowledge frequently in medicines and diseases? Please enter 1 for true and 0 for
        false and if you enter any different result this will break your exam"),nl,
    read(SQ2),nl,result((1,L,L1,L2,SQ1,SQ2),T).

```

Packed string (SWI7
for a list of codes)

Figure 44 Majors Questions Functions in Prolog – part 4

```

medQuestions(L,L1,L2,T):-  

( L==1->L1\==1->L2\==1),result((4,L,L1,L2,0,0),T);  

( L\==1->L1\==1->L2==1),result((4,L,L1,L2,0,0),T);  

( L\==1->L1==1->L2\==1),result((4,L,L1,L2,0,0),T);  

( L\==1->L1==1->L2==1),write("Do you have the ability to promote health education? Please enter 1 for true and 0 for false  

and if you enter any different result this will break your exam"),nl,  

read(SN1),nl,write("Do you have good practical skills? Please enter 1 for true and 0 for false and if you enter any different  

result this will break your exam"),nl,  

read(SN2),nl,result((4,L,L1,L2,SN1,SN2),T);  

( L==1->L1\==1->L2\==1),result((4,L,L1,L2,0,0),T);  

( L\==1->L1\==1->L2==1),write("Do you have the ability to promote health education? Please enter 1 for true and 0 for false  

and if you enter any different result this will break your exam"),nl,  

read(SN1),nl,write("Do you have good practical skills? Please enter 1 for true and 0 for false and if you enter any different  

result this will break your exam"),nl,  

read(SN2),nl,result((4,L,L1,L2,SN1,SN2),T);  

( L\==1->L1==1->L2\==1),write("Do you have the ability to promote health education? Please enter 1 for true and 0 for false  

and if you enter any different result this will break your exam"),nl,  

read(SN1),nl,write("Do you have good practical skills? Please enter 1 for true and 0 for false and if you enter any different  

result this will break your exam"),nl,  

read(SN2),nl,result((4,L,L1,L2,SN1,SN2),T);  

( L\==1->L1\==1->L2==1),write("Do you have the ability to promote health education? Please enter 1 for true and 0 for false  

and if you enter any different result this will break your exam"),nl,  

read(SN1),nl,write("Do you have good practical skills? Please enter 1 for true and 0 for false and if you enter any different  

result this will break your exam"),nl,  

read(SN2),nl,result((4,L,L1,L2,SN1,SN2),T).

```

Figure 45 Majors Questions Functions in Prolog – part 5

```

isdQuestions(L,L1,L2,T):-  

( L\==1-> L1\==1->L2\==1),result((5,L,L1,L2,0,0),T);  

( L\==1->L1\==1->L2==1),result((5,L,L1,L2,0,0),T);  

( L\==1->L1==1->L2\==1),result((5,L,L1,L2,0,0),T);  

( L\==1->L1==1->L2==1),write("Do you like to experiment with better and faster ways of doing things? Please enter 1  

for true and 0 for false and if you enter any different result this will break your exam"),nl,  

read(SM1),nl,write("Are you patient and open to criticism? Please enter 1 for true and 0 for false and if you enter any different  

result this will break your exam"),  

read(SM2),  

result((5,L,L1,L2,SM1,SM2),T);  

( L\==1->L1\==1->L2\==1),result((5,L,L1,L2,0,0),T);  

( L\==1->L1\==1->L2==1),write("Do you like to experiment with better and faster ways of doing things? Please enter 1  

for true and 0 for false and if you enter any different result this will break your exam"),nl,  

read(SM1),nl,write("Are you patient and open to criticism? Please enter 1 for true and 0 for false and if you enter any different  

result this will break your exam"),  

read(SM2),result((5,L,L1,L2,SM1,SM2),T);  

( L\==1->L1\==1->L2\==1),write("Do you like to experiment with better and faster ways of doing things? Please enter 1 for true and  

0 for false and if you enter any different result this will break your exam"),nl,  

read(SM1),nl,write("Are you patient and open to criticism? Please enter 1 for true and 0 for false and if you enter any different  

result this will break your exam"),read(SM2),  

result((5,L,L1,L2,SM1,SM2),T);  

( L\==1->L1==1->L2\==1),write("Do you like to experiment with better and faster ways of doing things? Please enter 1 for true  

and 0 for false and if you enter any different result this will break your exam"),nl,  

read(SM1),nl,write("Are you patient and open to criticism? Please enter 1 for true and 0 for false and if you enter any  

different result this will break your exam"),nl,  

read(SM2),nl,result((5,L,L1,L2,SM1,SM2),T).

```

Figure 46 Majors Questions Functions in Prolog – part 6

```

indQuestions(L,L1,L2,T):-
    ( L\==1-> L1\==1-> L2\==1),result((6,L,L1,L2,0,0),T);
    ( L\==1-> L1\==1-> L2==1),result((6,L,L1,L2,0,0),T);
    ( L\==1-> L1==1-> L2\==1),result((6,L,L1,L2,0,0),T);
    ( L\==1-> L1==1-> L2==1),write("Are you interested in design techniques, tools, and principles involved in production
                                         of precision technical plans, blueprints, drawings, and models? Please enter 1 for true
                                         and 0 for false and if you enter any different result this will break your exam"),nl,
    read(SK1),nl,write("Are you confident in your creativity? Do you like coming up with new ideas? Please enter 1 for true and 0
                                         for false and if you enter any different result this will break your exam"),nl,
    read(SK2),result((6,L,L1,L2,SK1,SK2),T);
    ( L==1-> L1\==1-> L2\==1),result((6,L,L1,L2,0,0),T);
    ( L==1-> L1\==1-> L2==1),write("Are you interested in design techniques, tools, and principles involved in production
                                         of precision technical plans, blueprints, drawings, and models? Please enter 1 for true
                                         and 0 for false and if you enter any different result this will break your exam"),nl,
    read(SK1),nl,write("Are you confident in your creativity? Do you like coming up with new ideas? Please enter 1 for true and 0
                                         for false and if you enter any different result this will break your exam"),nl,
    read(SK2),result((6,L,L1,L2,SK1,SK2),T);
    ( L==1-> L1==1-> L2\==1),result((6,L,L1,L2,0,0),T);
    ( L==1-> L1==1-> L2==1),write("Are you interested in design techniques, tools, and principles involved in production of
                                         precision technical plans, blueprints, drawings, and models? Please enter 1 for true and 0
                                         for false and if you enter any different result this will break your exam"),nl,
    read(SK1),nl,write("Are you confident in your creativity? Do you like coming up with new ideas? Please enter 1 for true and 0
                                         for false and if you enter any different result this will break your exam"),nl,
    read(SK2),result((6,L,L1,L2,SK1,SK2),T).

```

Figure 47 Majors Questions Functions in Prolog – part 7

```

nQuestions(L,L1,L2,T):-
    ( L\==1-> L1\==1,L2\==1),result((7,L,L1,L2,0,0),T);
    ( L\==1-> L1\==1,L2==1),result((7,L,L1,L2,0,0),T);
    ( L\==1-> L1==1,L2\==1),result((7,L,L1,L2,0,0),T);
    ( L\==1-> L1==1,L2==1),write("Are you patient, active, and do you love to work with children? Please enter
                                         1 for true and 0 for false and if you enter any different result this will
                                         break your exam"),nl,
    read(ST1),nl,write("Are you interested in working with patients, and do you have a strong sense of responsibility
                                         and sound judgment? Please enter 1 for true and 0 for false and if you enter any different
                                         result this will break your exam"),nl,
    read(ST2),result((7,L,L1,L2,ST1,ST2),T);
    ( L==1-> L1\==1,L2\==1),result((7,L,L1,L2,0,0),T);
    ( L==1-> L1\==1,L2==1),write("Are you patient, active, and do you love to work with children? Please enter 1
                                         for true and 0 for false and if you enter any different result this will break your exam"),nl,
    read(ST1),nl,write("Are you interested in working with patients, and do you have a strong sense of responsibility and sound
                                         judgment? Please enter 1 for true and 0 for false and if you enter any different result this will break
                                         your exam"),nl,
    read(ST2),result((7,L,L1,L2,ST1,ST2),T);
    ( L==1-> L1==1,L2\==1),write("Are you patient, active, and do you love to work with children? Please enter 1 for true and 0
                                         for false and if you enter any different result this will break your exam"),nl,
    read(ST1),nl,write("Are you interested in working with patients, and do you have a strong sense of responsibility and sound
                                         judgment? Please enter 1 for true and 0 for false and if you enter any different result this will break
                                         your exam"),read(ST2),nl,result((7,L,L1,L2,ST1,ST2),T);
    ( L==1-> L1==1,L2==1),write("Are you patient, active, and do you love to work with children? Please enter 1 for true and 0
                                         for false and if you enter any different result this will break your exam"),nl,
    read(ST1),nl,write("Are you interested in working with patients, and do you have a strong sense of responsibility
                                         and sound judgment? Please enter 1 for true and 0 for false and if you enter any different result
                                         this will break your exam"),
    read(ST2),nl,result((7,L,L1,L2,ST1,ST2),T).

```

Figure 48 Majors Questions Functions in Prolog – part 8

```

gdQuestions(L,L1,L2,T):-
    ( L\==1-> L1\==1-> L2\==1),result((8,L,L1,L2,0,0),T);
    ( L\==1-> L1\==1-> L2==1),result((8,L,L1,L2,0,0),T);
    ( L\==1-> L1==1-> L2\==1),result((8,L,L1,L2,0,0),T);
    ( L\==1-> L1==1-> L2==1),write("Do you have strong opinions about what you like and don't like in a particular field?
        Please enter 1 for true and 0 for false and if you enter any different result this will
        break your exam"),nl,
    read(SL1),nl,write("Are you interested in photography and film making? Please enter 1 for true and 0 for false and if you
        enter any different result this will break your exam"),
    read(SL2),nl,
    result((8,L,L1,L2,SL1,SL2),T);
    ( L==1-> L1\==1-> L2\==1),result((8,L,L1,L2,0,0),T);
    ( L==1-> L1\==1-> L2==1),write("Do you have strong opinions about what you like and don't like in a particular field?
        Please enter 1 for true and 0 for false and if you enter any different result this will
        break your exam"),nl,
    read(SL1),nl,write("Are you interested in photography and film making? Please enter 1 for true and 0 for false and if you
        enter any different result this will break your exam"),nl,
    read(SL2),nl,result((8,L,L1,L2,SL1,SL2),T);
    ( L==1-> L1\==1-> L2\==1),write("Do you have strong opinions about what you like and don't like in a particular field?
        Please enter 1 for true and 0 for false and if you enter any different result this will
        break your exam"),nl,
    read(SL1),nl,write("Are you interested in photography and film making? Please enter 1 for true and 0 for false and if you
        enter any different result this will break your exam"),nl,
    read(SL2),result((8,L,L1,L2,SL1,SL2),T);
    ( L==1-> L1\==1-> L2==1),write("Do you have strong opinions about what you like and don't like in a particular field?
        Please enter 1 for true and 0 for false and if you enter any different result this
        will break your exam"),nl,
    read(SL1),nl,write("Are you interested in photography and film making? Please enter 1 for true and 0 for false and if you
        enter any different result this will break your exam"),nl,
    read(SL2),result((8,L,L1,L2,SL1,SL2),T).

```

Figure 49 Majors Questions Functions in Prolog – part 9

```

bisQuestions(L,L1,L2,T):-
    ( L==1->L1\==1->L2\==1),result((9,L,L1,L2,0,0),T);
    ( L\==1->L1\==1->L2==1), result((9,L,L1,L2,0,0),T);
    ( L\==1->L1==1->L2\==1), result((9,L,L1,L2,0,0),T);
    ( L\==1->L1==1->L2==1), write("Are you good in analyzing data and numbers? Please enter 1 for true and 0 for false and if you
        enter any different result this will break your exam"),nl,
    read(S1),nl,write("Do you consider yourself a well-organized person? Please enter 1 for true and 0 for false and if you enter
        any different result this will break your exam"),nl,
    read(S2),nl,result((9,L,L1,L2,S1,S2),T);
    ( L==1->L1\==1->L2\==1), result((9,L,L1,L2,0,0),T);
    ( L==1->L1\==1->L2==1),write("Are you good in analyzing data and numbers? Please enter 1 for true and 0 for false and if you
        enter any different result this will break your exam"),nl,
    read(S1),nl,write("Do you consider yourself a well-organized person? Please enter 1 for true and 0 for false and if you enter
        any different result this will break your exam"),nl,
    read(S2),nl,result((9,L,L1,L2,S1,S2),T);
    ( L==1->L1\==1->L2\==1),write("Are you good in analyzing data and numbers? Please enter 1 for true and 0 for false and if you
        enter any different result this will break your exam"),nl,
    read(S1),nl,write("Do you consider yourself a well-organized person? Please enter 1 for true and 0 for false and if you enter
        any different result this will break your exam"),nl,
    read(S2),nl,result((9,L,L1,L2,S1,S2),T);
    ( L==1->L1\==1->L2==1),write("Are you good in analyzing data and numbers? Please enter 1 for true and 0 for false and if you
        enter any different result this will break your exam"),nl,
    read(S1),nl,write("Do you consider yourself a well-organized person? Please enter 1 for true and 0 for false and if you enter
        any different result this will break your exam"),nl,
    read(S2),nl,result((9,L,L1,L2,S1,S2),T).

```

Figure 50 Majors Questions Functions in Prolog – part 10

- *Comparison:*

Table 13: Majors Questions Functions comparison

Python	Prolog
<p>For each major questions, there is a function exists contains a list with the questions of the major. Then, a counter is initialized with 0 to count the 1's answers from the user. After that, a loop starts to collect answers for each item in the list associated with it, and in the case if the user's answer is 1 it will increment the counter by 1. Finally, it will check if the loop iteration reaches the third item in the list (index 2) and the counter less than 2, it will break the loop and not add the major name into suitable major list. Otherwise, in the case if the counter is greater than or equal 3, it will add the major name to the suitable major list by using the append function. Finally, all the appended majors will be printed by using the PrintSuitableMajor() function.</p> <p>As you can see even that the system is doing the same functionality, but since the structure of Python and Prolog is different, then the system components to do the same function may be written in different places to work well.</p>	<p>In each rule for each major, it uses the key value pair to check the questions and print the result based on the facts declared in the system.</p>

10. Attachments:

- Source code:

https://udksa-my.sharepoint.com/:f/g/personal/2170005648_iau_edu_sa/EpxGnLMvR_ZH01jTH2S7scABQ9C1YsYgKqfiVuDnHK99Uw?e=pKD2Qx