

ProgPulse Guide

*An Expert System for Best Matching Programming Language
Recommendation*

Assignment 2 – 204117B

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CM 3320 – Logic Programming &
Artificial Cognitive System

Batch 20

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Chapter 1: Introduction

1.1 Background

In the dynamic landscape of technology and software development, the choice of a programming language or framework can significantly impact the success of a project. The vast array of available programming languages, each with its unique strengths and applications, can often make the decision-making process overwhelming for aspiring developers. Recognizing this challenge, the "ProgPulse Guide" expert system emerges as a valuable tool designed to streamline the selection process by intelligently recommending the most suitable programming language or framework to learn for the coding enthusiasts based on their project requirements and personal preferences.

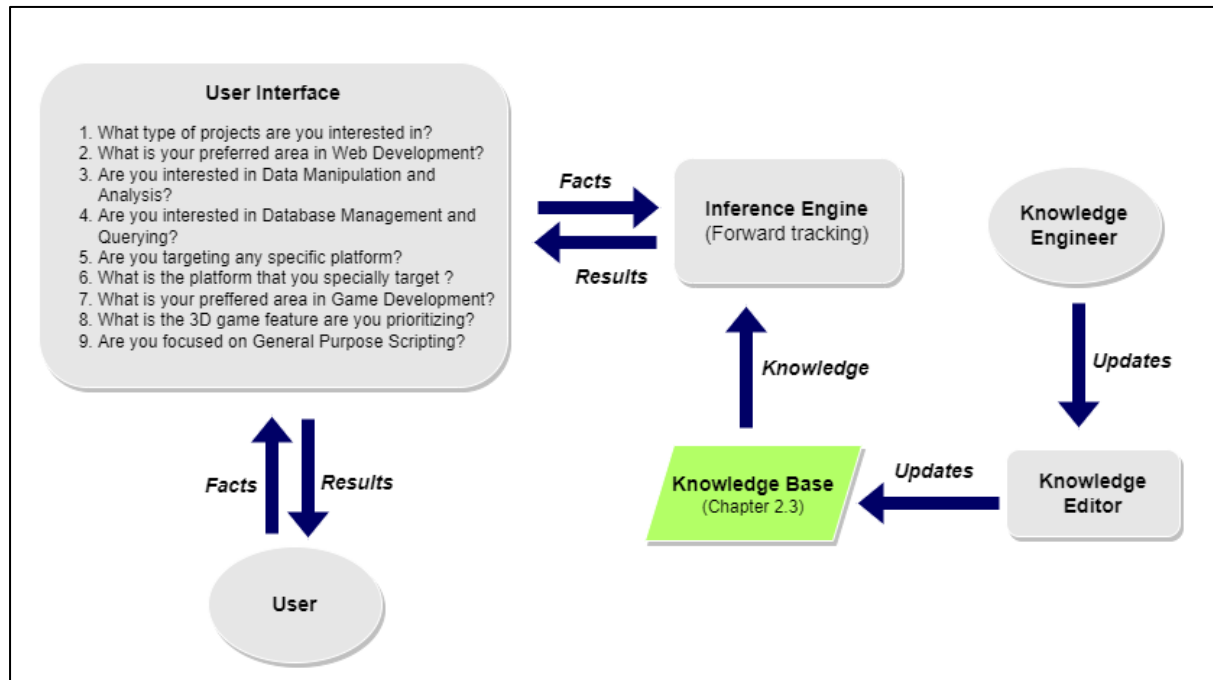
1.2 About ProgPulse Guide

“ProgPulse Guide” is the expert system that I have designed and implemented for this assignment. This expert system represents a fusion of artificial intelligence and domain expertise, aiming to empower individuals seeking to embark on a coding journey with a tailored and informed decision.

The main goal of this expert system is assessing different programming languages and frameworks, considering how they match with specific project requirements and personal preferences. The system understands the details and how everything fits together, so it can recommend the best matching programming language or framework that needs to be learnt by a particular user.

Chapter 2: Functional Overview

2.1 System Architecture



- **User:**

The User is the person interacting with the ProgPulse Guide, inputting project requirements and personal preferences to receive tailored programming language recommendations.
- **User Interface:**

The User Interface serves as the bridge between the user and the ProgPulse Guide, providing an intuitive platform for inputting information and receiving language recommendations.
- **Inference Engine:**

The Inference Engine is the brain of the system, processing user inputs and leveraging programmed rules to deduce the most suitable programming language based on project characteristics and personal inclinations.

- **Knowledge Base:**

The Knowledge Base is the repository of information within the ProgPulse Guide, storing data about various programming languages, frameworks, and their compatibility with different project types. The knowledge engineer creates the knowledge base, which the knowledge editor can edit.

Further explanation on Knowledge Base of the system has been included in the Chapter 2.3.

- **Knowledge Editor:**

The Knowledge Editor is a tool that allows administrators or developers to update and modify the information stored in the Knowledge Base, ensuring the system is up-to-date with the latest insights and trends in programming languages.

- **Knowledge Engineer:**

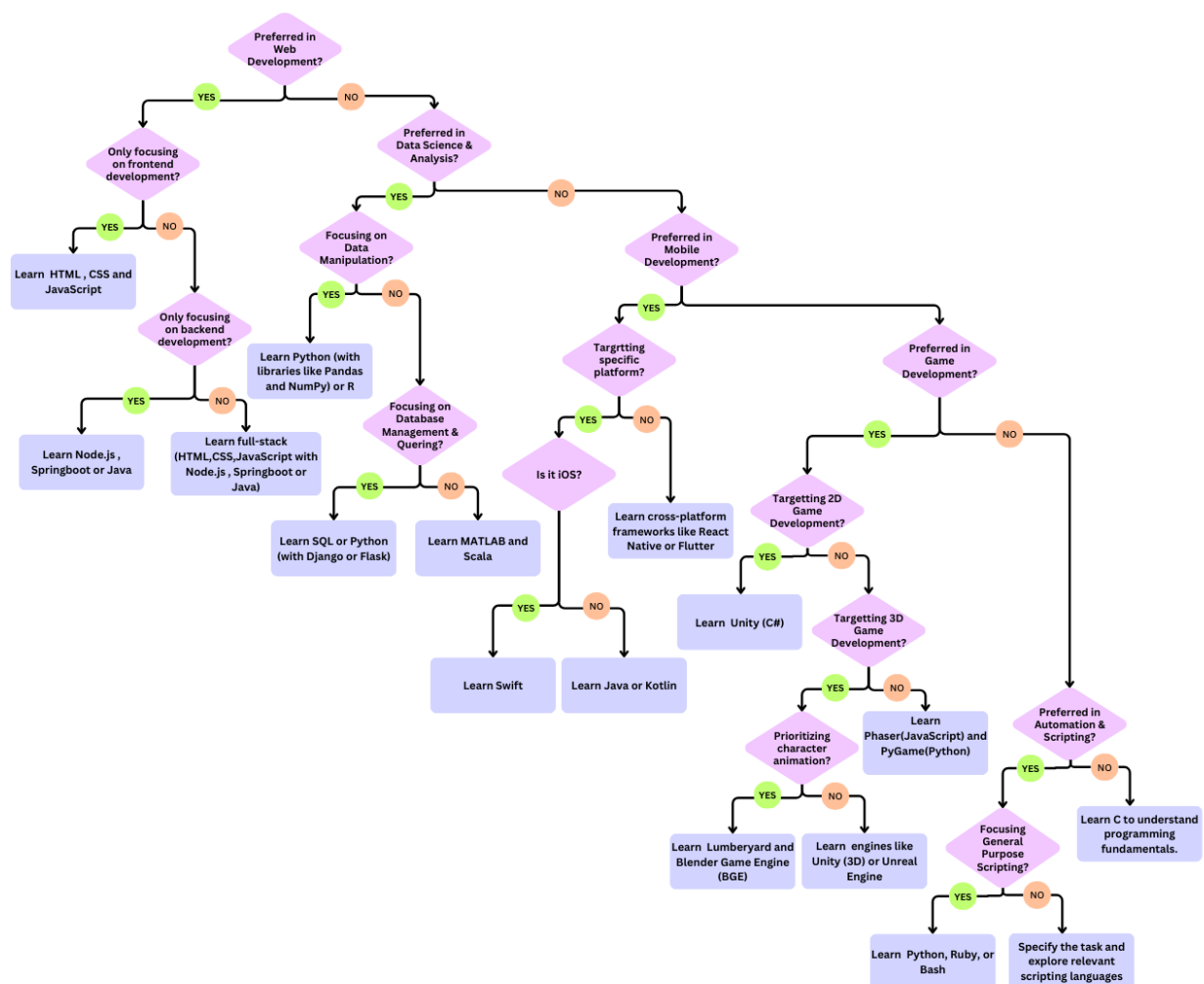
The Knowledge Engineer is the expert responsible for shaping the ProgPulse Guide's understanding. They curate and refine the rules and information in the Knowledge Base, fine-tuning the system to provide accurate and relevant language recommendations.

2.2 Decision Tree

The “ProgPulse Guide” utilizes a decision tree to enhance functionality. This tree-like structure efficiently processes user inputs, navigating through a series of programmed rules and criteria. As the system progresses through the branches of the decision tree, it dynamically evaluates project requirements and user preferences, ultimately leading to a well-informed recommendation for the most suitable programming language. This decision tree framework ensures a systematic and accurate approach, contributing to the precision and effectiveness of the ProgPulse Guide's language selection process.

Link for the Decision tree :

https://drive.google.com/file/d/1AY7BxKu_l4pfLF2DHqLrzaK0G2wGxu1R/view?usp=sharing



2.3 Knowledge Base - ProgPulse Guide

Knowledge Base consists of facts and rules. It integrates established facts with rule-based logic, empowering the ProgPulse Guide to make informed decisions by drawing on a wealth of knowledge about programming languages and their practical applications. Facts and rules of the ProgPulse Guide are as follows.

Facts :

1. Preferred to work on Web Development or not
2. Focusing only frontend development or not
3. Focusing only backend development or not
4. Preferred to work on Data Science or not
5. Targeting data manipulation and analysis or not
6. Targeting database management or not
7. Preferred to work on Mobile App Development or not
8. Focusing a specific mobile platform or not
9. Focused mobile platform is ios or not
10. Preferred to work on Game Development or not
11. Prioritizing 2D game development or not
12. Prioritizing 3D game development or not
13. Preferred to work with character animation or not
14. Preferred to work on Automation and Scripting or not
15. Focusing on general purpose scripting or not

Rules:

- Rule 01 : If preferred to work on web development, focusing only the frontend development ,Then learn HTML,CSS and JavaScript.
- Rule 02 : If preferred to work on web development, not focusing the frontend development ,focusing only the backend development Then learn Node.js , Springboot or Java.
- Rule 03 : If preferred to work on web development, not focusing only the frontend development,not focusing only the backend development Then learn full stack (HTML,CSS,JavaScript with Node.js , Springboot or Java)

- Rule 04: If preferred to work on Data Science , targeting data manipulation ,Then learn Python(with libraries like Pandas and NumPy) or R.
- Rule 05: If preferred to work on Data Science , not targeting data manipulation ,targeting database management and querying ,Then learn SQL or Python (with Django or Flask).
- Rule 06 : If preferred to work on Data Science , not targeting data manipulation ,not targeting database management and querying ,Then learn MATLAB and Scala.
- Rule 07: If preferred to work on Mobile App Development , focusing a specific mobile platform ,that focused platform is ios,Then learn Swift.
- Rule 08: If preferred to work on Mobile App Development , focusing a specific mobile platform,that focused platform is not ios,Then learn Kotlin or Java.
- Rule 09: If preferred to work on Mobile App Development ,not focusing a specific mobile platform ,Then learn cross-platform frameworks like React Native or Flutter.
- Rule 10: If preferred to work on Game Development , prioritizing 2D game development,Then learn Unity (C#).
- Rule 11: If preferred to work on Game Development ,not prioritizing 2D game development, prioritizing 3D game development,preferred to work with character animation,Then learn Lumberyard and Blender Game Engine (BGE).
- Rule 12: If preferred to work on Game Development ,not prioritizing 2D game development, prioritizing 3D game development,not preferred to work with character animation,Then learn engines like Unity (3D) or Unreal Engine.
- Rule 13 : If preferred to work on Game Development ,not prioritizing 2D game development, not prioritizing 3D game development,Then learn Phaser(JavaScript) and PyGame(Python).
- Rule14 : If preferred to work on Automation and Scripting , focusing on general purpose scripting ,Then learn Python, Ruby, or Bash.
- Rule15 : If preferred to work on Automation and Scripting , not focusing on general purpose scripting ,Then specify the task and explore relevant scripting languages.
- Rule16 : If do not have specific preference for any given area , Then learn C to understand programming fundamentals.

Chapter 3: Implementation

First I have created the user interface of ProgPulse Guide in a notepad and saved it as “ProgPulse_knowledgeBase.clp”. All the questions asked from the user and available options are included there.

```
(defrule p1
  (or ?p <- (start))
  =>
  (printout t crlf crlf "    Welcome to ProgPulse Guide ! An Expert to Choose Best Matching Programming Languages" crlf)
  (printout t " ")
  (printout t crlf crlf "Hi, I'm thrilled to help you to find the perfect programming language/framework according to your project requirements and personal preference." crlf crlf "To guide you on this exciting adventure, I'll need a bit more info. Don't worry, it's just a friendly chat!")
  crlf crlf "What type of projects are you interested in?"
  crlf crlf "1. Web Development"
  crlf "2. Data Science and Analysis"
  crlf "3. Mobile App Development"
  crlf "4. Game Development"
  crlf "5. Automation and Scripting"
  crlf "6. No Specific Area"
  crlf crlf "Enter Your Answer (1|2|3|4|5): "
  (assert (projectType (read)))
  (retract ?p)
)
```

;-----Asking about preference for specific area in Web Development-----

```
(defrule read-webDevArea
  (projectType 1) =>
  (printout t crlf "What is your preferred area in Web Development?" crlf crlf "1. Frontend Development" crlf "2. Backend Development" crlf "3. Full-stack Development" crlf crlf "Enter Your Answer (1|2|3): ")
  (assert (preferenceWD (read))))
```

;-----Asking about preferred area in Data Science and Analysis-----

```
(defrule read-preferenceDataManipulation
  (projectType 2)
  =>
  (printout t crlf "Are you interested in Data Manipulation and Analysis?" crlf crlf "1. Yes" crlf "2. No" crlf crlf "Enter Your Answer (1|2): ")
  (assert (dataManipulation (read))))
```

```
(defrule read-preferenceDatabase
  (projectType 2)(dataManipulation 2)
  =>
  (printout t crlf "Are you interested in Database Management and Querying?" crlf crlf "1. Yes" crlf "2. No" crlf crlf "Enter Your Answer (1|2): ")
  (assert (database (read))))
```

;-----Asking about specific platforms in Mobile App Development-----

```
(defrule read-platformSpecific
  (projectType 3) =>
  (printout t crlf "Are you targetting any specific platform?" crlf crlf "1. Yes" crlf "2. No" crlf crlf "Enter Your Answer (1|2): ")
  (assert (platformSpecific (read))))
```

```
(defrule read-platformName
  (projectType 3)(platformSpecific 1) =>
  (printout t crlf "What is the platform that you specially target ?" crlf crlf "1. Android"
```

```
;-----Asking about specific platforms in Mobile App Development-----
```

```
(defrule read-platformSpecific
  (projectType 3) =>
  (printout t crlf "Are you targetting any specific platform?"
   crlf crlf "1. Yes"
   crlf "2. No"
   crlf crlf "Enter Your Answer (1|2): ")
  (assert (platformSpecific (read))))

(defrule read-platformName
  (projectType 3)(platformSpecific 1) =>
  (printout t crlf "What is the platform that you specially target ?"
   crlf crlf "1. Android"
   crlf "2. iOS"
   crlf crlf "Enter Your Answer (1|2): ")
  (assert (platformName (read))))
```

```
;-----Asking about preffered area in Game Development-----
```

```
(defrule read-gamingDevArea
  (projectType 4) =>
  (printout t crlf "What is your preffered area in Game Development?"
   crlf crlf "1. 2D Game Development"
   crlf "2. 3D Game Development"
   crlf "3. No preference"
   crlf crlf "Enter Your Answer (1|2|3): ")
  (assert (gamingDevArea (read))))

(defrule read-preferred3Dfeature
  (projectType 4)(gamingDevArea 2) =>
  (printout t crlf "What is the 3D game feature are you prioritizing?"
   crlf crlf "1. Environmental Design"
   crlf "2. Character Animation"
   crlf crlf "Enter Your Answer (1|2): ")
  (assert (preferred3Dfeature (read))))
```

```
crLf 2. iOS
crlf crlf "Enter Your Answer (1|2): ")
(assert (platformName (read))))
```

```
;-----Asking about preffered area in Game Development-----
```

```
(defrule read-gamingDevArea
  (projectType 4) =>
  (printout t crlf "What is your preffered area in Game Development?"
   crlf crlf "1. 2D Game Development"
   crlf "2. 3D Game Development"
   crlf "3. No preference"
   crlf crlf "Enter Your Answer (1|2|3): ")
  (assert (gamingDevArea (read))))

(defrule read-preferred3Dfeature
  (projectType 4)(gamingDevArea 2) =>
  (printout t crlf "What is the 3D game feature are you prioritizing?"
   crlf crlf "1. Environmental Design"
   crlf "2. Character Animation"
   crlf crlf "Enter Your Answer (1|2): ")
  (assert (preferred3Dfeature (read))))
```

```
;-----Asking about specifications in Automation & Scripting-----
```

```
(defrule read-scriptingArea
  (projectType 5) =>
  (printout t crlf "Are you focused on General Purpose Scripting?"
   crlf crlf "1. Yes"
   crlf "2. No"
   crlf crlf "Enter Your Answer (1|2): ")
  (assert (scriptingArea (read))))
```

Then I coded all 16 rules of the ProgPulse Guide's knowledge base in that file.

If the user prefers to work on Web Development, then Rule 01, Rule 02 and Rule 03 are executed and recommend most suitable programming languages for them to learn according to their project requirements and personal preference.

```
;-----Programming Language Recommendation-----
```

```
;-----Rule-01 Web Development , Frontend Development Programming Languages -----
```

```
(defrule recommendation1 (projectType 1)(preferenceWD 1) =>
  (printout t crlf "Recommendation : Consider learning HTML , CSS and JavaScript" crlf crlf))
```

```
;-----Rule-02 Web Development , Backend Development Programming Languages -----
```

```
(defrule recommendation2 (projectType 1)(preferenceWD 2) =>
  (printout t crlf "Recommendation : Consider learning Node.js , Springboot or Java" crlf crlf))
```

```
;-----Rule-03 Web Development , Full-stack Development Programming Languages -----
```

```
(defrule recommendation3 (projectType 1)(preferenceWD 3) =>
  (printout t crlf "Recommendation : Consider learning full-stack HTML,CSS,JavaScript with Node.js , Springboot or Java" crlf crlf))
```

If the user is preferred to work on Data Science and Analysis , then Rule 04,Rule 05 and Rule 06 are executed and recommend most suitable programming languages for them to learn according to their project requirements and personal preference.

```
;-----Rule-04 Data Science , Data Manipulation and Analysis Programming Languages -----
(defrule recommendation4 (projectType 2)(dataManipulation 1) =>
(printout t crlf "Recommendation : Consider learning Python (with libraries like Pandas and NumPy) or R " crlf crlf))

;-----Rule-05 Data Science , Database Management and Querying Programming Languages -----
(defrule recommendation5 (projectType 2)(dataManipulation 2)(database 1) =>
(printout t crlf "Recommendation : Consider learning SQL or Python (with Django or Flask)" crlf crlf))

;-----Rule-06 Data Science , Other areas Programming Languages -----
(defrule recommendation6 (projectType 2)(dataManipulation 2)(database 2) =>
(printout t crlf "Recommendation : Consider learning MATLAB and Scala" crlf crlf))
```

If the user prefers to work on Mobile App Development, then Rule 07,Rule 08 and Rule 09 are executed and recommend most suitable programming languages for them to learn according to their project requirements and personal preference.

```
;-----Rule-07 Mobile App Development , iOS platform Programming Languages -----
(defrule recommendation7 (projectType 3)(platformSpecific 1)(platformName 1) =>
(printout t crlf "Recommendation : Consider learning Swift" crlf crlf))

;-----Rule-08 Mobile App Development , Android platform Programming Languages -----
(defrule recommendation8 (projectType 3)(platformSpecific 1)(platformName 2) =>
(printout t crlf "Recommendation : Consider learning Kotlin or Java" crlf crlf))

;-----Rule-09 Mobile App Development , Cross Platform Programming Languages -----
(defrule recommendation9 (projectType 3)(platformSpecific 2) =>
(printout t crlf "Recommendation : Consider learning cross-platform frameworks like React Native or Flutter" crlf crlf))
```

If the user prefers to work on Game Development, then Rule 10,Rule 11,Rule 12 and Rule 13 are executed and recommend most suitable programming languages for them to learn according to their project requirements and personal preference.

```
;-----Rule-10 Game Development , 2D Gaming Programming Languages -----
(defrule recommendation10 (projectType 4)(gamingDevArea 1) =>
(printout t crlf "Recommendation : Consider learning Unity (C#)" crlf crlf))

;-----Rule-11 Game Development , 3D Gaming, Prioritizing Character Animation Programming Languages -----
(defrule recommendation12 (projectType 4)(gamingDevArea 2)(preferred3DFeature 1) =>
(printout t crlf "Recommendation : Consider learning Lumberyard and Blender Game Engine (BGE)" crlf crlf))

;-----Rule-12 Game Development , 3D Gaming , Prioritizing Environmental Design Programming Languages -----
(defrule recommendation11 (projectType 4)(gamingDevArea 2)(preferred3DFeature 2) =>
(printout t crlf "Recommendation : Consider learning engines like Unity (3D) or Unreal Engine" crlf crlf))

;-----Rule-13 Game Development , No Specific Preferred Area Programming Languages -----
(defrule recommendation13 (projectType 4)(gamingDevArea 3) =>
(printout t crlf "Recommendation : Consider Phaser(JavaScript) and PyGame(Python)" crlf crlf))
```

If the user prefers to work on Automation and Scripting, then Rule 14 and Rule 15 are executed and recommend most suitable programming languages for them to learn according to their project requirements and personal preference.

```
;-----Rule-14 Automation & Scripting, General Purpose Programming Languages -----
(defrule recommendation14 (projectType 5)(scriptingArea 1) =>
(printout t crlf "Recommendation : Consider learning Python, Ruby, or Bash" crlf crlf))

;-----Rule-15 Automation & Scripting, Task specific Programming Languages -----
(defrule recommendation15 (projectType 5)(scriptingArea 2) =>
(printout t crlf "Recommendation : Specify the task (e.g., automation, data processing) and learn relevant scripting languages" crlf crlf))
```

If the user prefers does not have special preference for any given area in coding, then Rule 16 is executed and recommend learn C programming language which will be useful to learn programming fundamentals. It will help user to learn other programming languages easily.

```
;-----Rule-16 No preference for given specific areas of coding -----
(defrule recommendation16 (projectType 6) =>
(printout t crlf "Recommendation : Consider learning C to understand programming fundamentals. That will help you to learn other programming languages easily." crlf crlf))
```

Link for the “ProgPulse_knowledgeBase.clp” :

<https://drive.google.com/file/d/12iavSwW4AbypRQ4u7JlrV6g2zEfbu4gL/view?usp=sharing>

Chapter 4: Testing and Evaluation

First “ProgPulse_knowledgeBase.clp” file should be loaded to the CLIPS to run the “ProgPulse Guide” expert system. For that following commands are used.

```
CLIPS (6.4.1 4/8/23)
CLIPS> (reset)
CLIPS> (load "C:/Users/user/Desktop/ProgPulse_knowledgeBase.clp")
*****
TRUE
CLIPS> (assert (start))
<Fact-1>
CLIPS> (run)
```

The following picture shows how the user interface is displayed after running the expert system. It contains a brief introduction about the system and it shows the first question asked from the user. That question has 6 options as the answer. User can select one answer and enter the relevant number as an input to the system.

```
CLIPS> (reset)
CLIPS> (load "C:/Users/user/Desktop/ProgPulse_knowledgeBase.clp")
*****
TRUE
CLIPS> (assert (start))
<Fact-1>
CLIPS> (run)

Welcome to ProgPulse Guide ! An Expert to Choose Best Matching Programming Languages
-----
Hi, I'm thrilled to help you to find the perfect programming language/framework according to your project requirements and personal preference.
To guide you on this exciting adventure, I'll need a bit more info. Don't worry, it's just a friendly chat!
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 5
```

4.1 Test Cases

Then I have tested all the rules of the knowledge base by giving relevant inputs according to the particular scenario. Outputs of all 16 rules are included below and it confirms that all the logic I have implemented for ProgPulse Guide is working successfully.

- **Rule 01** : If preferred to work on web development, focusing only the frontend development ,Then [learn HTML,CSS and JavaScript](#).

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 1

What is your preferred area in Web Development?

1. Frontend Development
2. Backend Development
3. Full-stack Development

Enter Your Answer (1|2|3): 1

Recommendation : Consider learning HTML , CSS and JavaScript
```

- **Rule 02** : If preferred to work on web development, not focusing the frontend development ,focusing only the backend development Then [learn Node.js , Springboot or Java](#).

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 1

What is your preferred area in Web Development?

1. Frontend Development
2. Backend Development
3. Full-stack Development

Enter Your Answer (1|2|3): 2

Recommendation : Consider learning Node.js , Springboot or Java
```

- **Rule 03** : If preferred to work on web development, not focusing only the frontend development,not focusing only the backend development Then [learn full stack](#) (HTML,CSS,JavaScript with Node.js , Springboot or Java)

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 1

What is your preferred area in Web Development?

1. Frontend Development
2. Backend Development
3. Full-stack Development

Enter Your Answer (1|2|3): 3

Recommendation : Consider learning full-stack HTML,CSS,JavaScript with Node.js , Springboot or Java
```

- **Rule 04** : If preferred to work on Data Science , targeting data manipulation ,Then [learn Python \(with libraries like Pandas and NumPy\) or R](#).

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 2

Are you interested in Data Manipulation and Analysis?

1. Yes
2. No

Enter Your Answer (1|2): 1

Recommendation : Consider learning Python (with libraries like Pandas and NumPy) or R
```

- **Rule 05** : If preferred to work on Data Science , not targeting data manipulation ,targeting database management and querying ,Then [learn SQL or Python \(with Django or Flask\)](#).

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 2

Are you interested in Data Manipulation and Analysis?

1. Yes
2. No

Enter Your Answer (1|2): 2

Are you interested in Database Management and Querying?

1. Yes
2. No

Enter Your Answer (1|2): 1

Recommendation : Consider learning SQL or Python (with Django or Flask)
```

- **Rule 06** : If preferred to work on Data Science , not targeting data manipulation ,not targeting database management and querying ,Then [learn MATLAB and Scala](#).

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 2

Are you interested in Data Manipulation and Analysis?

1. Yes
2. No

Enter Your Answer (1|2): 2

Are you interested in Database Management and Querying?

1. Yes
2. No

Enter Your Answer (1|2): 2

Recommendation : Consider learning MATLAB and Scala
```


- **Rule 07** : If preferred to work on Mobile App Development , focusing a specific mobile platform ,that focused platform is ios,Then [learn Swift](#).

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 3

Are you targetting any specific platform?

1. Yes
2. No

Enter Your Answer (1|2): 1

What is the platform that you specially target ?

1. iOS
2. Android

Enter Your Answer (1|2): 1

Recommendation : Consider learning Swift
```

- **Rule 08** : If preferred to work on Mobile App Development , focusing a specific mobile platform ,that focused platform is not ios,Then [learn Kotlin or Java](#).

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 3

Are you targetting any specific platform?

1. Yes
2. No

Enter Your Answer (1|2): 1

What is the platform that you specially target ?

1. iOS
2. Android

Enter Your Answer (1|2): 2

Recommendation : Consider learning Kotlin or Java
```

- **Rule 09** : If preferred to work on Mobile App Development ,not focusing a specific mobile platform ,Then [learn cross-platform frameworks like React Native or Flutter](#).

```

What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 3

Are you targetting any specific platform?

1. Yes
2. No

Enter Your Answer (1|2): 2

Recommendation : Consider learning cross-platform frameworks like React Native or Flutter
CLIPS>

```

- **Rule 10** : If preferred to work on Game Development , prioritizing 2D game development,Then [learn Unity \(C#\)](#).

```

What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 4

What is your preffered area in Game Development?

1. 2D Game Development
2. 3D Game Development
3. No preference

Enter Your Answer (1|2|3): 1

Recommendation : Consider learning Unity (C#)

```

- **Rule 11** : If preferred to work on Game Development ,not prioritizing 2D game development, prioritizing 3D game development,preferred to work with character animation,Then [learn Lumberyard and Blender Game Engine \(BGE\)](#).

```

What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 4

What is your preferred area in Game Development?

1. 2D Game Development
2. 3D Game Development
3. No preference

Enter Your Answer (1|2|3): 2

What is the 3D game feature are you prioritizing?

1. Character Animation
2. Environmental Design

Enter Your Answer (1|2): 1

Recommendation : Consider learning Lumberyard and Blender Game Engine (BGE)

```

- **Rule 12** : If preferred to work on Game Development ,not prioritizing 2D game development, prioritizing 3D game development,not preferred to work with character animation,Then [learn engines like Unity \(3D\) or Unreal Engine](#).

```

What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 4

What is your preferred area in Game Development?

1. 2D Game Development
2. 3D Game Development
3. No preference

Enter Your Answer (1|2|3): 2

What is the 3D game feature are you prioritizing?

1. Character Animation
2. Environmental Design

Enter Your Answer (1|2): 2

Recommendation : Consider learning engines like Unity (3D) or Unreal Engine

```

- **Rule 13** : If preferred to work on Game Development ,not prioritizing 2D game development, not prioritizing 3D game development,Then [learn Phaser\(JavaScript\)](#) and [PyGame\(Python\)](#).

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 4

What is your preferred area in Game Development?

1. 2D Game Development
2. 3D Game Development
3. No preference

Enter Your Answer (1|2|3): 3

Recommendation : Consider Phaser(JavaScript) and PyGame(Python)
```

- **Rule14** :If preferred to work on Automation and Scripting , focusing on general purpose scripting ,Then [learn Python, Ruby, or Bash](#).

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 5

Are you focused on General Purpose Scripting?

1. Yes
2. No

Enter Your Answer (1|2): 1

Recommendation : Consider learning Python, Ruby, or Bash
```

- **Rule15** :If preferred to work on Automation and Scripting , not focusing on general purpose scripting ,Then [specify the task \(e.g., automation, data processing\)](#) and [explore relevant scripting languages](#).

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 5

Are you focused on General Purpose Scripting?

1. Yes
2. No

Enter Your Answer (1|2): 2

Recommendation : Specify the task (e.g., automation, data processing) and learn relevant scripting languages
```

- **Rule16** :If do not have specific preference for any given area , Then [learn C to understand programming fundamentals](#).

```
What type of projects are you interested in?

1. Web Development
2. Data Science and Analysis
3. Mobile App Development
4. Game Development
5. Automation and Scripting
6. No Specific Area

Enter Your Answer (1|2|3|4|5): 6

Recommendation : Consider learning C to understand programming fundamentals. That will help you to learn other programming languages easily.
```

Chapter 5: Conclusion

In conclusion, the Pro Lang Guide expert system stands as a valuable tool for aspiring programmers, offering a systematic and informed approach to selecting the most suitable programming language. Through its intuitive user interface, intelligent inference engine, and a robust knowledge base of facts and rules, the system streamlines the decision-making process, considering both project requirements and individual preferences. As technology continues to evolve, the Pro Lang Guide exemplifies the synergy between human expertise and artificial intelligence, providing users with tailored recommendations that contribute to successful and satisfying coding experiences.