20CYS312 - Principles of Programming Languages
Exploring Programming Paradigms

Assignment-01

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Outline

Imperative Programming Paradigm

Imperative Programming Paradigm: It is one of the oldest programming paradigm. It works by changing the program state through assignment statements. It performs step by step task by changing state. The main focus is on how to achieve the goal.

Key concepts and features commonly associated with Imperative programming:

- State and Variables
- Sequencing
- Modularity
- Efficiency
- Error Handling

Languages that follow Imperative Programming Paradigm:
C,C++,Python,C,Fortran,Pascal.

Two real-world applications for imperative programming are:
Database(SQL),GUI(java).

Imperative - C++

Imperative - C++: C++ is an imperative programming language that follows the imperative paradigm. In imperative programming, the focus is on describing how a program should achieve a particular task through a sequence of statements that change the program's state.

Here are some key features of imperative programming in C++:

- Variables and State
- Control Structures
- Functions and Procedures
- Error Handling

Paradigms Supported for C++ are Imperative,Object-Oriented Programming,Procedural,Functional,Event-Driven Programming (GUI Programming).

File Extension: .cpp

Current Version: C++23 (19 March 2023)

Scripting Programming Paradigm

Scripting Programming Paradigm: All scripting languages are programming languages. The scripting language is basically a language where instructions are written for a run time environment. They do not require the compilation step and are rather interpreted.

Key concepts and features commonly associated with Scripting programming:

- Interpreted Execution
- Dynamic Typing
- Scripting in Web Development
- Community and Libraries
- Scripting for Prototyping

Languages that follow the scripting programming paradigm include: Python,Ruby.

Two real-world applications for scripting programming are:
Automation of System Administration Tasks,Web Development and Server-Side Scripting.

Scripting - Python

Scripting - Python: Python, a general-purpose scripting language with simple syntax, also used as an extension language.Python is a high-level programming language. Its design philosophy emphasizes code readability with the use of significant indentation.Python is dynamically typed and garbage-collected.

Here are some Key features of scripting programming in Python include:

- Interpreted Language
- Dynamic Typing
- High-Level Language
- Support for Object-Oriented Programming (OOP)

Paradigms Supported for python are Scripting,Procedural,Object-Oriented Programming (OOP),Functional Programming,Reflective Programming.

File Extension: .py

Current Version: 3.13 (Jan 10,2024)

Comparison and Discussions:

- C++ offers better performance due to compilation, while Python focuses on productivity with ease of use.
- C++ requires manual memory management, whereas Python employs automatic memory management.
- C++ is commonly used in system-level programming, games, and performance-critical applications while Python excels in scripting, web development, and data science.
- C++ has a mature and diverse ecosystem, especially in domains like game development and embedded systems where as Python has a vast ecosystem, thriving in web development, data science, and automation.
- C++ relies on explicit error handling mechanisms like exceptions while Python follows a more forgiving approach with exception handling.
- Languages that support both imperative and scripting paradigms are Python, Ruby, JavaScript, Perl.

References

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