# Impact of Programming Paradigms

## T1 Chapter 1

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Text Book: T1. T. W. Pratt, M. V. Zelkowitz, "Programming Languages Design and Implementation‖, 4th Ed, PHI, ISBN 81-203-2035-2.

# Programming Paradigm

- A programming paradigm is a fundamental style of computer programming.

- Programming paradigms differ in:
  - the concepts and abstractions used to represent the elements of a program (such as objects, functions, variables, constraints, etc.)
  - the steps that compose a computation (assignation, evaluation, data flow, control flow, etc.).

# Programming Paradigm

- Some languages are designed to support one particular paradigm
  - Smalltalk supports object-oriented programming
  - Haskell supports functional programming
- Other programming languages support multiple paradigms
  - Object Pascal, C++, C#, Visual Basic, Common Lisp, Scheme, Perl, Python, Ruby, Oz and F#.
- The design goal of multi-paradigm languages is to allow programmers to use the best tool for a job, admitting that no one paradigm solves all problems in the easiest or most efficient way.

# Impact of Programming Paradigms

## T1 Chapter 1

- Problem Solving
- What is Programming Language
- Software Design

# Problem Solving

Problem solving encompasses the following activities:

- Defining the system
- Analyzing the system defined
- Detailed system specification
- Design the system
- Implement the design
- Testing & Debugging
- Validation

# Prominent Programming Paradigms

| Paradigm | Aspect | |
|---|---|---|
| | **Corresponding languages** | **Key features** |
| Structured programming | Imperative programming languages<br>Examples: FORTRAN, COBOL, Pascal, C | • Sequential execution of instructions<br>• "Goto" less programs<br>• Use of variables representing memory locations<br>• Use of assignment to change values of variables<br>• Conditional branch and iterative statements<br>• Recursion is an alternative to iteration |
| Object-oriented programming | Object oriented programming languages<br>Examples: Smalltalk, SNOBOL, C++, Java | • Object is the basic building block. An object is characterized by state and behavior. The state is specified by the attributes and the behavior is specified by the methods<br>• Encapsulation, polymorphism, and inheritance as the foundational concepts that give an identity to this paradigm |

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| Functional programming | Applicative programming languages<br>Example: LISP | • The basic building block is a function<br>• There is no notion of variable and assignment<br>• Iteration is not supported<br>• Recursion is the key facility |
| Logic programming | Declarative programming languages<br>Example: PROLOG | • Logic programming is based on symbolic logic<br>• A logic program is a collection of declarations which are true about the desired result. These are called facts<br>• No notion of flow-of-control<br>• A set of rules that operate on the facts are defined<br>• A query reports the results drawn from the facts and governed by the rule base<br>• The inference engine ensures the validity of the results |

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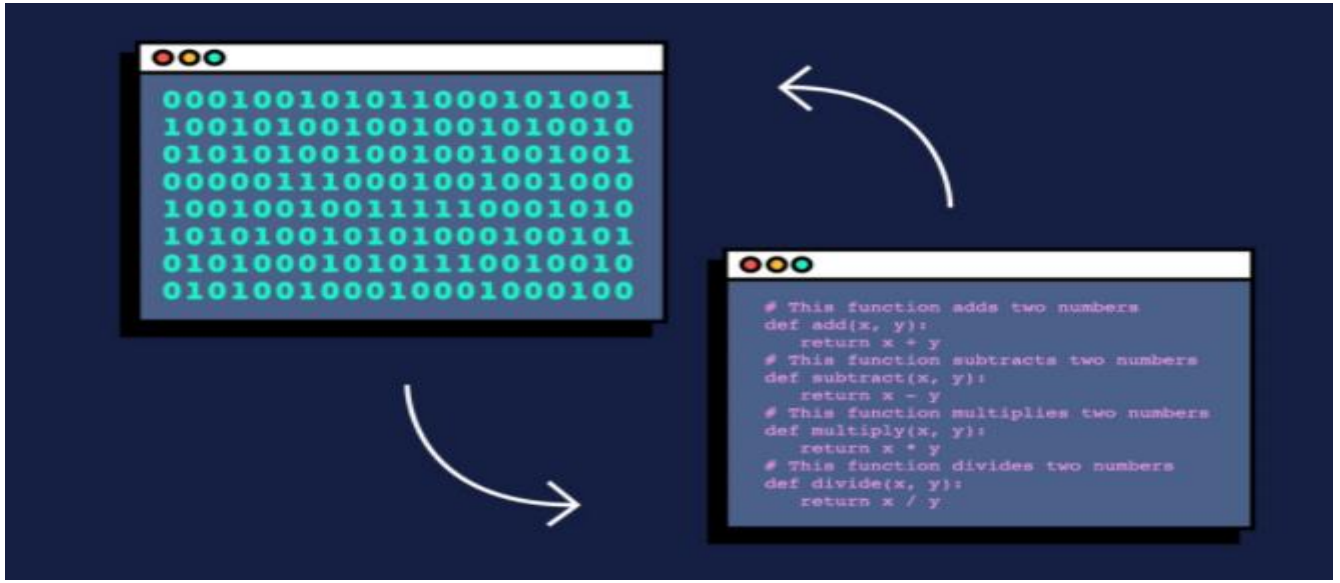
| Event-driven programming | Visual programming languages<br>Examples: Visual Basic, Visual C++ | • Programming is based on the set of anticipated events<br>• The base system recognizes the events as they occur and coordinates the necessary responses<br>• This paradigm is very useful in developing a good user interface |
| Concurrent programming | Parallel programming languages<br>Examples: Concurrent Pascal, ParC, PARLOG, Occam | This paradigm supports multi-threading (segments of the same program can be executed concurrently) and synchronization (facilitates cooperation amongst the several threads) |
| Distributed programming | Network and internet programming languages<br>Example: Java | Synchronization and Semantics for message passing form the core support for implementing Remote Procedure Call (RPC) or Remote Method Invocation (RMI) |
| Database programming [4 GLs] | Structured query languages<br>Example: SQL | • This paradigm provides a structured way of framing the query on a RDBMS<br>• It also provides the framework for verifying and validating the query results |

# What is Programming Language?

- A programming language is a **computer language** that is used by **programmers (developers) to communicate with computers**.
- A programming language is mainly used to **develop desktop applications, websites, and mobile applications**



# Software Design

- Software design is a process to transform user requirements into some suitable form, which helps the programmer in software coding and implementation

# Thank You