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Programming Languages Generalization

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Abstract: Languages are defined as key concern for interfacing, it may be from human to human communication, or may be machine to human communication or vice-versa it is the age of technology, every data and application is getting online ,which needs designing formats and layered specifications with packaged processes at different stages.Each process is comprises of different combinations of routines, algorithms, which are designed in different languages and are grouped in a common platform for stable working.Here in this paper language designs in different applications and packages has been presented for their portable study and result.

Introduction: This Paper provides brief discussion about the computer programming languages, their features, limitations and applications. Each language has their own scope of working and methodologies and also different research domain needs, different[1,2] logical computational, mathematical evaluation and implementation schemes, No single programming language is universally acceptable for each domain and for working experiments .The platform depends on type of function required. More research, technologies and work needs to be done on languages to make convenient platform for universal applications.

Study of several programming languages shown below:

ASSEMBLY LANGUAGE

- **Features**

  - Uses Mnemonics (ADD, SUB, MUL etc) for operation[3] and string of character for computer memory address locations.
  - It is machine dependent (Processor dependent) language.
  - Assembler is used for converting assembly language to machine language.
  - User directly works on Registers.

- **Problems**

  - Difficult to write programs as Mnemonics are complex.
  - Complex structure of programs for accessing memory locations and values, and thus not a user friendly language.
  - Use for specific applications.
  - Its execution time is more than Machine language.

- **Applications**

- Use in Microprocessors and in chip designing's.
- Code is embedded in chip and use in different specific applications like Washing machines, aircraft controls etc.
- Use in Real Time Applications.

HIGH LEVEL LANGUAGE

- **Features**

- User friendly language, easy to learn and understand[4].
- Provides simple structure and syntax and logical controls.
- User works on memory locations.
- It is machine independent, user syntax designing or easily human understandable language.
- C,C++,Java, Cobol etc are example of high level languages, It supports English and other languages.

- **Problems**

- Takes more time for execution as compared to assembly[5] language.
- Generates insufficient code.

- **Application**

- Use for developing user applications like Internet application, mobile application, games, web-sites etc.

MACHINE LANGUAGE

- **Features**

- First type of programming language in computer history for development and designing.
- It is represented by 0 and 1 and its logical ordering. It is only understand by computers.
- 0- It represents absence of electric pulse and 1- represents[6] presence of electric pulse and computer only could understand these pulses.

- **Problems**

- Difficult to remember codes and sequences.
- Difficult to find errors in 0 and 1 bits and its combinations.

- **Application**

- Provides fast execution as no conversion of code is required here.
- Use for High End Computational processes.

PASCAL

- **Features**

- Structure programming language designed to understand basics of computer programming. It contains logics and semantics of programming.
- It supports built in data types, user defined data types, defined set of data structures[7].

- **Problems**

- Difficulty in creating array size and string length, because it does not supports the creation of variable length array and string.
- Does not contain sufficient library for programming.
- Boolean variables are wrongly interpreted.

- **Applications**

- It supports structured programming approaches, so could be use for learning basic concepts of coding and programming modules.
- Provides base for development of new languages.

FORTRAN

- **Features**

- It is acronym of FORmula TRANslation. Specially use[3,4] for solving complex mathematical problems. It uses simple approach for the translation of math formula into programming code.
- Problem oriented or mathematical functions oriented language.
- Machine independent language, provides efficient execution.

- **Problems**

- Accessing of same memory location as used by user code.
- Slower development as compared to other languages.

- **Application**

- Efficient for creating and designing complex mathematical equation and functions.
- Best suited for Scientific, Statistical and mathematical procedures, Research oriented language.
- Best suited for computational process than Input/output[2,5] based process.

PYTHON

- **Features**

- It is an Object Oriented and interpreted programming language.
- Supports dynamic data types, interfaces, classes, exceptions and libraries.
- Portable language for all hardware and software platforms and applications.
- Supports lists, tuples and dictionaries for converting ideas or texts into lines of code directly.
- It could be extended with C modules and codes.

- **Problems**

- It uses reference counting methods, implemented by pointer for memory management. This could cause loss of address and data link.
- Provides slow execution of code.
- Object-oriented features are complex to use.

- Problems in declaration of variables and global function.

- **Application**

- Use for developing internet or web applications.

- Provides flexible communication between internet pages, database connection or network socket connections, and are popular for network designing.

COBOL

- **Features**

- It is abbreviated for COmmon Business Oriented Language. Use for business applications[6,7].

- Every variables and records are defined in details and are use for developing business applications and concepts.

- Supports class libraries, visual programming environment and integration with internet application

- **Problems**

- Does not support flexibility with complex mathematical operations.

- Does not provide graphical designing completely.

- **Application**

- It is suitable for business application to understand features in detail.

- First language used by Department-of-Defense (DoD).

LISP

- **Features**

- Supports symbolic data representation. And abbreviated as list processing.

- It is an interpreted language and scripting language.

- Provides functional programming style. And provides uniform representation of code and data

- Supports automatic garbage collection

- **Problems**

- Strongly supports functional style.

- Difficult for development of complex applications

- **Application**

- Best suited for theorem automation, and use for Artificial Intelligence Domain.

- Use in research areas like image processing, pattern recognition.

- Use in defense systems.

PROLOG

- **Features**

- Computational based logical language

- Object-Oriented language and interpreted language.

- Visual Prolog is available, which supports IDE and oop features.

- **Problems**

- Does not contains standard Input/output features.
- Difficult in implementing arrays and does not contains functional notations.

- **Application**

- Use in A.I. Field, Natural Language Processing, databases, games, expert system, control system , backtracking problems.

SMALLTALK

- **Features**

- It is an purely object oriented, interpreted, dynamically types language and provides graphical environment.
- Best controlling of integer overflow problem.
- Code can be stored in object and could be executed later by sending or generating message.
- Exceptions techniques are best suited here,
- Provides easy access to compiler.

- **Problems**

- Does not provide multi threading environment.
- Difficult to find and correct errors.
- Does not support interfaces.

- **Application**

- Best suited in telecommunication system.
- Use in business information systems.
- Use in oscilloscope programming.

SCALA

- **Features**

- It is object oriented and functional language.
- Provides interoperability with Java and compatible with java programs and could run on android applications.
- Java can call methods of scala and vice versa.

- **Problems**

- Does not support static members.
- Contains little complexity in coding.
- Provides lazy evaluation.

- **Application**

- Application for web-services
- Use in pattern matching.

C

- **Features**

- Flexible procedure oriented language, provides fast execution.
- Support features of system programming and user based logic programming.

- Support libraries for hardware (Input/output) accessing coding mechanism.

- **Problems**

- Does not support controlling of errors and exceptions.
- Limitation on variable type's declaration.

- **Application**

- Use for designing operating system kernels and applications.
- Use for designing games and hardware applications.

C++

- **Features**

- Supports Object-Oriented-Programming approach and features.
- User could create their own class and function for future designing's.
- It is a Hybrid of different language.

- **Problems**

- Does not support automatic garbage collection.
- It has defective operator overloading.
- Does a not support compile time and run time encapsulation.
- Limited libraries are available for use.
- Limitation in accessing of member functions.

- **Application**

- Suited for graphical applications and games.
- Use for software engineering processes.

JAVA

- **Features**

- Object-Oriented-Language, Platform Independent language.
- Contains Rich and updated collection of standard libraries.
- Supports advanced concepts like exception handling, automatic garbage collection, networking and various important security concepts.
- Supports I/O and networking, packages and classes. Provides flexible communication over network.
- Provides independent communication environment among interconnected system and independent GUI applications.

- **Problems**

- Problem in conversion of data between C and Java platform for native data types.
- Compile time errors are generated for large array size.

- **Application**

- Use for internet application and web pages.
- Use for Client-Server application and network designing's.

PERL

- **Features**

- It is abbreviated for Practical Extraction and Reporting Languages. It is a high level, interpreted scripting language.
- Scripting language is that, which provides easy processing of reports, data, field, text etc
- It is a Hybrid language, contains programming features as like of C language.
- Provides easy manipulation of text files.

- **Problems**

- Difficult to write and maintain large codes.
- Complex numerical code takes more time, when designed in Perl language

- **Application**

- Use in network programming, graphical programming etc.

RUBY

- **Features**

- Scripting language used for web services.
- Could be use as an alternative to AJAX.
- Simple human style language, programmer could easily interpret its syntax.
- It is an interpreted, fully object oriented language.

- **Problems**

- Contains lots of conventional programming rules.

- **Application**

- Use for web application designing.

PHP

- **Features**

- It is abbreviated for Preprocessor Hypertext. It is an object oriented language.
- Use for server side programming, web page creation and as client side scripting language.
- Its Syntax is similar to C language.

- **Problems**

- Ambiguities in function handling.
- Execution is slower.

- **Application**

- Use for creating web-pages.

DOTNET

- **Features**

- Codes are similar to C,C++ ,JAVA and Visual basic languages.
- Provides parallel programming environment.
- Fully object oriented language.
- Most of the languages could be implemented on this platform like python, java, c++ etc

- **Problems**

- Platform specific language.

- Requires more system resource as compared to other languages.
- Problems in reverse engineering of code.

- **Application**

- Use for internet, mobile applications.
- Supportability of Multilanguage's on single platform provides flexibility for application designing.

Code Design (programming Complexity)

Designing and development requires lines of code or statement, they may be of any type functional, structural or object-oriented but they contain logic of programming. If designer wish to design Web application, Database, Tool design, Language design, Any Software application, every concept needs some rules or logic for designing.

Several algorithms are available but still there are chase of creating new design or algorithm, which provides better complexity values and performance. So, more works needs to be done to develop efficient algorithm.

Conclusion: This Paper summarized programming language ideas, features, applications and their problems. The centralized structure of language is required to develop efficient platform. This chapter stated that thousands of concepts, algorithm, tools, architecture, and software are available for survey and study, only need is to develop new platform by observing technological abilities.

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