

Computer Organization and Architecture

كلية التربية للعلوم الصرفة / جامعة ديالى

Lecture 10

Programming Language Types



Procedural-Oriented Language (3GL)

This programming executes a series of statements that lead to an outcome. Usually, this kind of programming uses heavy loops, multiple variables and some other elements, that is also a major difference between procedural and functional languages. The procedural functions can manage the variables, other than the value returns for these functions. For instance, information printing out. In these languages, the instructions of the program are written in order or in a defined direction in which they should be executed to solve some problem. It means that the program instructions are very important in the Procedural-Oriented languages.

Logic Programming Language

The logic programming languages permit the programmers to create declarative statements and formerly let the machine to aim about outcomes of statements. It can be said that this language would not tell the machine to do something but using the margins on what it should consider doing. Logic programming languages are easier to program in C in an object-oriented style. In reality, many languages include features and ideas from numerous domains, that just supports to raise the practicality of this kind of languages. However, there are many programming languages that are not we suited with other types of languages.

Pascal Language Is an
Easy to Learn and Understand
LANGUAGE FOR BEGINNERS





Object-Oriented Programming

This programming language treats the data as a collection of objects that have some internal data and external portions of that data. This programming aims to think about the problem by separating it into objects collection that offers solutions that can be used to resolve a particular issue. The object-oriented programming language main principles are encapsulation that stated that everything an object will require should be inside an object. This programming stresses on the reusability via inheritance and the ability to spread present executions without having to transform a huge amount of programming code through using the polymorphism.

Problem-Oriented Language (4GL)

The problem-oriented language is said to be a programming language who manage structures and particularly data structures replicate in some characteristics measure of a problems class, such as scientific computation or commercial data processing. By distinction, the machine-oriented structures of a show the internal mechanical structure. It permits the users to stipulate what the result would be, without discussing all the details about the manipulation of data to produce the outcomes. This language is said to be one is one step ahead from Object-oriented Programing Language. These languages include database query language and they are typical result oriented.

PHP Is A **Scripting**
Language That You
Can Use to Make A
Website Rapidly





Scripting Programming Language

The scripting programming languages are often procedural and most of them include some elements of the object-oriented language but have their own category as they are not full-fledged languages for large systems development support in general. For instance, they might not have any checking for the compile-time type. Typically, to get started these type of programming languages needs small syntax. A script or scripting language is a kind of programming that provides a special run-time setting that automates the execution of the task; these are said to be the tasks that alternatively executed one after other by some human operator. Rather than being compiled, the scripting languages are interpreted frequently. The environments that can be computerized via scripting include web pages within a web browser, software applications, embedded systems, using shells of operating systems and also many other games.

Functional Programming

The functional programming usually uses for storing the data, often evading loops in recursive functions favour. This type of programming language also focusses on the functions return values, and there are also some of the side effects and different recommends that state of storing is discouraged powerfully. For instance, functional programming is said to be a useful and pure language, in a function is named, it's expected that the function will perform not or modify operation.

It might create some algorithmic calls and change the parameters of calls. Functional languages are typically easier to figure on abstract matters, though, they will even be “more than the machine” in their model of programming that also makes it hard to know, but the programming code is decoded into machine language that is also troublesome for programming of the system.

Java Language is A
Multi-Platform Language
That is Majorly **Helpful**
in **Networking**



Java

Java is a general-purpose programming language that is object-oriented, class-based, and made to have some implementation needs as conceivable. It is basically designed to allow the application developers to write the code in Java for once, run anywhere (WORA), it means that Java code when compiled can be executed on all podiums that support Java without any recompilation need. The applications in Java are assembled to bytecode that you can run on Java virtual machine (JVM) irrespective of the system architecture. Some of the programs in Java have a status of being sluggish and consume more memory as compared to the code written in C++ language.

The Java is multi-platform programming that's is an ideal option for networking. Obviously, typically this language is used in the web development with Java applets. Nevertheless, Java is also used to make programs that can be run on different platforms, as it is quite similar to the C++ syntax and structure. For programmers of C++, Java is an easy language to understand and learn and it also provides some benefits offered by the object-oriented programming. You must

PHP

The PHP is a kind of scripting language that can also be used to design web pages. If you want to make some website rapidly, it is the finest option available in the market, and as a result, it also contains features that would allow you to generate a link to databases and HTTP headers easily. PHP is a scripting language that comprises some components allows the programmer to effortlessly get up to speed. Nevertheless, it has more complex features of object-oriented programming.

The PHP is basically designed to make the web pages and from time to time it is used as a scripting language. As a scripting language, it comprises a set of components that allow the developers to improve the overall speed. This language would help you to make a website and by using the amazing features of the PHP you can also create the links to the databases of the website. Nevertheless, Php features are said to be more sophisticated than other object-oriented languages. Other than web development, you can also use the PHP can be used for many other tasks related to programming, for example, it can be used in the robotic drone control and standalone graphical applications. Basic

C++ Programming Language is Used to **Manage Projects** with **Large Scope**



C++ Programming

For the project with a larger scope, the C++ is an ideal option because of its object-oriented structure. By using this language, the programmers can cooperate one program into other components or even one separate work on program's all part. The object-oriented structure, in this language also allows the code written in C++ to be reused. So, it can be said that C++ is a well-organized language. When it comes to the selection of programming language, not very much depends on your personal choice and your requirements. For most of the programmers, it is a good option to select.

C++ was made with a biasness toward system programming, resource-constrained software, embedded and large systems, with flexibility, performance, and efficiency of use as its design. Its language is very useful in numerous contexts, with major strengths being the infrastructure of software and resource-constrained apps, including servers, desktop apps, (such as Web search, SQL servers or e-commerce), and performance-critical apps (such as space probes or telephone switches)

C Language

The C language is a very popular programming language and it is a basic and simple language, mainly used in programming for game, C language includes the added C++ packing; The programmers prefer to use C language as it makes the program faster. Though, the overall credibility of this also provides the C++ reusability to get a minor rise in the performance of C. C is also said to be a domineering procedural language. It was made to be executed by using a comparatively upfront compiler to offer low-level memory access and it also plots that map proficiently to machine commands, all with slight support at runtime. There is no doubt that its capabilities are low, the language was made to inspire programming on cross-platform. A C program standards-compliant written with transportability can be executed on various operating systems and computer platforms with few variations to its coding. The C language is also accessible on numerous platforms, from supercomputers to fixed microcontrollers.

Fortran Language is
A Useful Language for
Engineers to Perform High
Precision Calculations



Fortran Language

Fortran permits different variables sizes up to the memory space in the system. This language is a collection of crunching languages that are used by scientists. It is an ideal choice for the engineers, who need to compute high precision values. The Fortran program is very inflexible that also make the readability of the code more difficult. Fortran language is a useful language for engineers to perform high precision calculations.

Fortran includes a versions lineage, that progressed to add some extensions while it typically gets some compatibility with preceding versions. Some of the consecutive versions of this provides additional support for object-oriented programming (Fortran 2003), character-based data processing and structured programming (FORTRAN 77), concurrent programming (Fortran 2008), Fortran high performance (Fortran 95), modular programming, generic programming, and array programming (Fortran 90), and native capabilities of parallel computing. The design of the Fortran language was the base for numerous other languages. You might hear about BASIC, that is also based on FORTRAN II with many syntax cleanups, particularly better logical constructions, and some changes to work more simply in a collaborative setting.

COBOL

The COBOL is mainly used in finance, administrative, and business systems for governments and companies. This is still extensively used in legacy apps positioned on computers mainframe, for example, transaction processing jobs and large-scale batch. But because of its decreasing fame and the skilled COBOL programmer's retirement, all of the programs written on it are now migrated to other platforms, replaced with recent languages or other software packages. Most COBOL programming is to preserve existing apps. COBOL also have an English-like syntax, that was made to be highly readable and self-documenting.

The COBOL also supports 3 formats of file: indexed, relative and sequential. In sequential files, all of the data records are adjoining and should be traversed consecutively, just like a connected list. In case of indexed files that have at least one indexed to allow records to be accessed randomly and that can be organized on them. It was planned to be an easy language for the programmers to understand and learn the best thing about this language is that it can be] readable to non-technical staff, for example, the management in the company. The readability of the COBOL is high because of the use of English-like

Pearl Language Is Used for Searching **Text and Perform** Useful **Server Functions**



Pearl Language

The Perl is a UNIX-based file management language. This language is very popular for its common gateway interface programming. It is a term used for programs performed by the web servers can allow added web pages capabilities. Pearl is also said to be a technique text for searching that is also used for valued server functions and databases, and it is easy to select some of the basics in case you have any knowledge and understand of any programming language. As a common gateway interface programming, Perl is selected by the web hosting services over C++. The Perl is more preferred in the web hosts can evaluate the Perl script files. When C++ is executed, although they are text files. Pearl language is used for searching text and perform useful server functions.

PEARL also supports both floating-point and fixed-point character string data, character, and values and also the bit values. It offers more amenities for multi-dimensional arrays and structures. Both untyped and typed pointers are supported under this language, with typecasting. Because of the presence of this language, Wall discovered the current PEARL earlier Perl's release and changed the name spelling.

Pascal Language

The Pascal is typically a teaching language and there are just very few industries using it for the programming purposes. Pascal inclines to use keywords in place of braces and symbols in the C language. So, it can be said that this language is easy to learn and understand for the beginners to get skilled on as compared with the C++, C languages. The Borland is a software company, that is also using the Delphi for improving its industrial potential. The Delphi is said to be an object-oriented language of Pascal, and currently, Borland compilers software company is the only organization use it. Pascal language is easy to learn and understand language for beginners.

The Pascal was affected by the efforts of ALGOL W, with some of the clear goals of making a language that will be effectual in both the run-time and compiler, permit for the development of the well-structured program, and to be valuable for structured programming teaching to the students. A student's generation used Pascal as a preliminary language in academic courses. The Pascal originally is a completely procedural and comprises the ALGOL-like array control structures with some reserved words for example then, if, while, else, case ranging and for, on a begin-end statements

Scheme Language is A Popular Language With **Simple** **Syntax** and Features



Scheme Language

The scheme is also used as the substitute for the LISP language (LISP is typically used in computer science study and its syntax is easy and simple for the developers for structures implementations.), it has simpler features and syntax. Under the scheme, the project results in LISP language re-implementation. The scheme is one of the most popular preliminary languages in the computer science field. This language simply solves the difficulties rather than worrying about programming syntaxes. If you have no programming knowledge than it is a good language to start your coding with because of its easy and simple syntax. Scheme language is a popular language with simple syntax and features.

So, it can be said that the scheme is a programming language that is supported by various paradigms, with imperative and functional programming. It is one of the 3 major languages of LISP, with the Clojure and Common Lisp. Different from common LISP, it follows a simple philosophy design, stipulating a standard core with influential tools for an extension. This is widely used in schools and other courses related to computer science.

MACHINE CODE VERSUS ASSEMBLY LANGUAGE

MACHINE CODE

A computer program written in machine language instructions that can be executed directly by a computer's central processing unit (CPU)

Consists of binaries, which are zeros and ones

Only understood by the CPU

Depends on the platform or the operating system

Can be directly executed by the CPU to perform the defined tasks in the computer program

ASSEMBLY LANGUAGE

A low-level programming language in which there is a strong correspondence between the program's statements and the architecture's machine code instructions

Follows a syntax similar to the English Language

Understood by the programmer

Consists of a set of standard instructions

Used by applications such as real-time systems, and microcontroller-based embedded systems

Compiler	Interpreter
Compiler Takes Entire program as input	Interpreter Takes Single instruction as input .
Intermediate Object Code is Generated	No Intermediate Object Code is Generated
Conditional Control Statements are Executes faster	Conditional Control Statements are Executes slower
Memory Requirement : More (Since Object Code is Generated)	Memory Requirement is Less
Program need not be compiled every time	Every time higher level program is converted into lower level program
Errors are displayed after entire program is checked	Errors are displayed for every instruction interpreted (if any)
Example : C Compiler	Example : BASIC