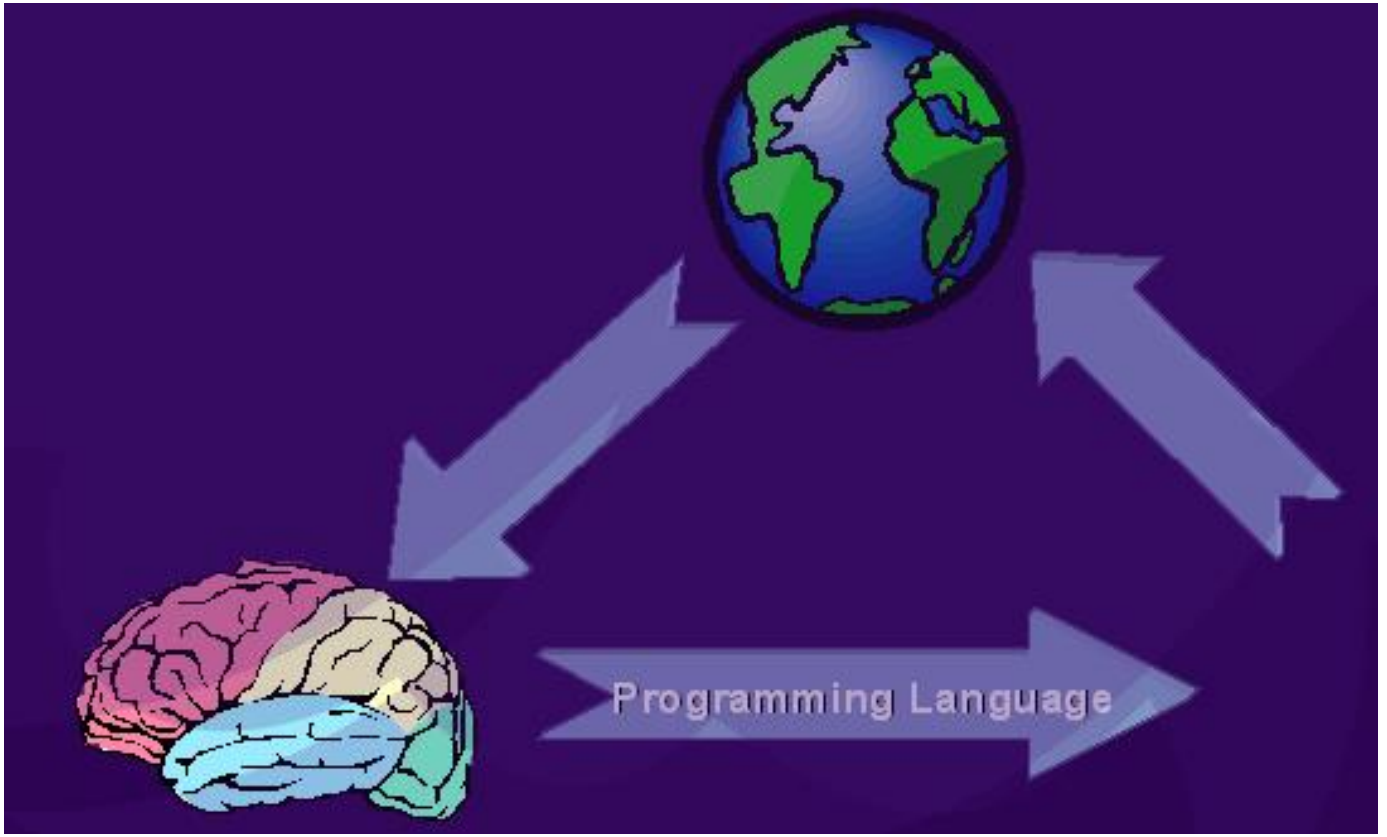
INTRODUCTION TO PROGRAMMING LANGUAGE

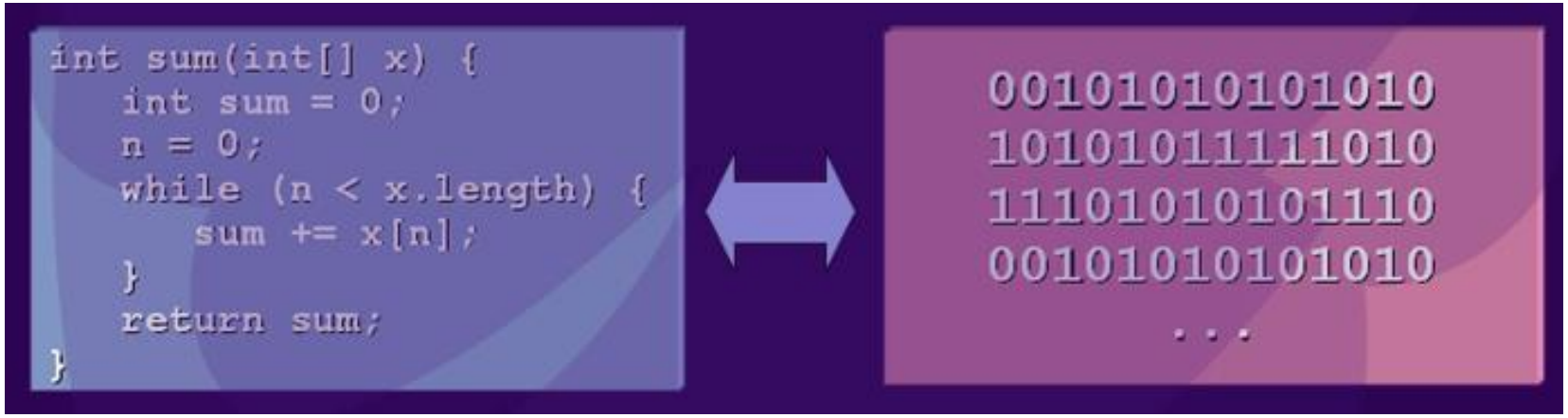
What is a programming language?



INTRODUCTION TO PROGRAMMING LANGUAGE

What is a programming language?

- Abstraction of virtual machine

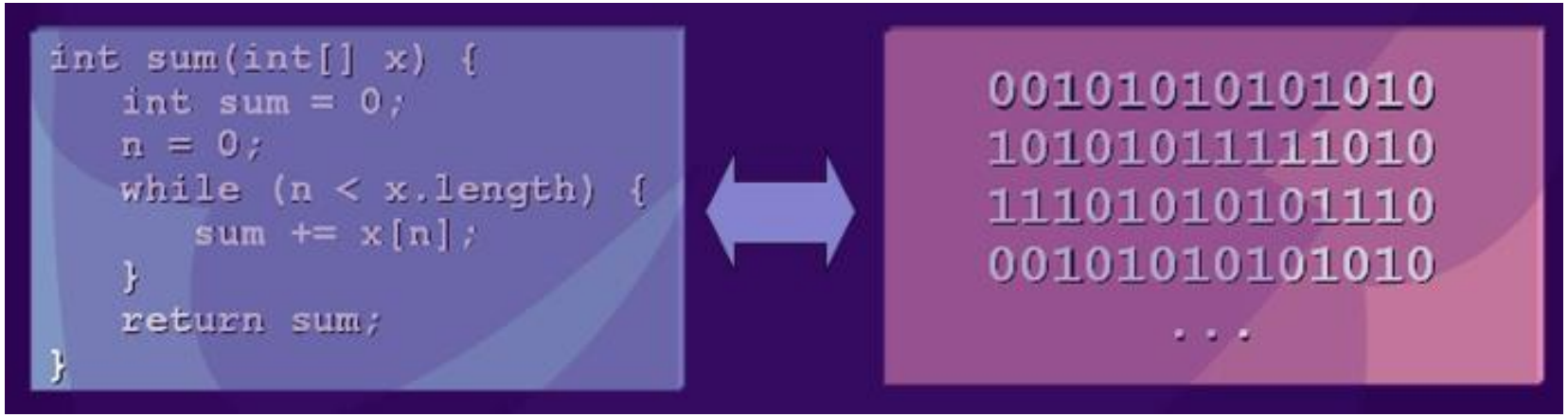


INTRODUCTION TO PROGRAMMING LANGUAGE

What is a programming language?

-Donald Knuth:

>> Programming is the art of telling another human being what one wants the computer to do



INTRODUCTION TO PROGRAMMING LANGUAGE

Why program?

- Computer – Programmable machine designed to follow instructions

- Program – instructions in computer memory to make it do something

- Programmer – person who writes instructions (programs) to make computer perform a task

So, without programmers, no program; without programs, computer cannot do anything

INTRODUCTION TO PROGRAMMING LANGUAGE

Programs and Programming Languages

- Program – A sets of instructions to a computer to perform a task

- Programming Language – a language used to write programs

INTRODUCTION TO PROGRAMMING LANGUAGE

Programming Languages Generations

- Programming languages are characterized from what computer do and how close they are to what people do.
  - First generation – machine language
  - Second generation – assembly language
  - Third generation – Language that use interpreter and compiler to translate to machine language
  - Fourth generation – language that closer to human language

INTRODUCTION TO PROGRAMMING LANGUAGE

Programming Languages Generations

- First and second generation:
  - Low-level: used for communication with computer hardware directly. Often written in binary machine code directly

- Third and Fourth generation:
  - High-level: Closer to human language

INTRODUCTION TO PROGRAMMING LANGUAGE

Programming Languages Generations

- Interpreter:
  - a translator which translates one line of source code and instructs the computer to perform the result before translating another line of source code.

- Compiler:
  - a translator which translates all the source code and produce a complete machine language program.

HISTORY OF PROGRAMMING LANGUAGE

First language

Ada Lovelace and Babbage and its nephew were writing programs for the project of difference engine, then the analytical engine, of Babbage.

In 1945, the german K. Zuse, inventor of the Z3 computer would have defined an evolved language for this engine (with arrays and records). Few documents on this language exist.

HISTORY OF PROGRAMMING LANGUAGE

Assembly

Assemblers exist since the begin of computers. They associate a symbolic name to the machine-language code, for example:

```
add bx, 4
cmp [adr], 3
jmp address
```

Assembly programming is not longer frequently practiced, even for fast routines...

HISTORY OF PROGRAMMING LANGUAGE

Autocoder - 1952

Alick E Glennie

This is a symbolic code.

HISTORY OF PROGRAMMING LANGUAGE

IPL - 1956

Information Processing Language

A Newell, H Simon, JC Shaw

Low-level list processing language.

HISTORY OF PROGRAMMING LANGUAGE

Fortran - 1954-1958

FORmula TRANslator system

John Backus and other researchers at IBM.

Language dedicated to mathematical calculations.

HISTORY OF PROGRAMMING LANGUAGE

Lisp - 1958-1960

LISt Processing

Mac Carthy

Funtional language for list processing.

HISTORY OF PROGRAMMING LANGUAGE

Algol - 1960 / Algol W - 1966 / Algol 68

ALGOrithmic Language

Defined by an international consortium of computer science specialists.
(no compiler found)
This was the fist universal language to be machine independent.

HISTORY OF PROGRAMMING LANGUAGE

Cobol - 1960

COmmon Business Oriented Language.

Defined by a committee, the CODASYL, COnference on DAta SYsystems Languages.

The committee under the Department Of Defense with manufacturers, universities and users, worked from May 1959 to April 1960.

HISTORY OF PROGRAMMING LANGUAGE

Cobol - 1960

Classical procedural language aimed at enterprise management, in which a program is divided in 4 divisions: identification, environment, data, procedure, and they may be divided in sections. It was founded on data and a program must describe precisely the hardware and input/output data format.

It introduced the RECORD data structure.

HISTORY OF PROGRAMMING LANGUAGE

APL - 1964

A Programming Language

K Iverson.

Language using a mathematical notation, with lot of operators. A unique type, the array.
Defined from 1957 to 1960, implemented in 1964.

HISTORY OF PROGRAMMING LANGUAGE

Basic - 1964

Beginner’s All-purpose Symbolic Instruction Code

John Kemeny, Thomas Kurtz

Has been designed in 1963, to be easy to learn and has been implemented in 1964.

HISTORY OF PROGRAMMING LANGUAGE

Basic - 1964

Bill Gate and Paul Allen have win an international contest by designing and implementing a fast and compact Basic.
Micro-computers were delivered with Basic in ROM until late 80.

HISTORY OF PROGRAMMING LANGUAGE

Iswim - 1965

If You See What I Mean.

P. Landin

First purely functional language, in the mathematical sense. The first to use LAZY EVALUATION.

HISTORY OF PROGRAMMING LANGUAGE

CPL

Combined Programming Language.

Cambridge and London Universities.

This was a combination of Algol 60 and functional language aimed at proof of theorems.
Complex, was not implemented. It was a step toward the design of the C language.

HISTORY OF PROGRAMMING LANGUAGE

BCPL - 1965

Basic CPL.

Martin Richards

It has been intended to be a simplified version of CPL. Was using these control structures: FOR, LOOP, IF THEN, WHILE, UNTIL, REPEAT, REPEAT WHILE, SWITCH CASE, etc...

HISTORY OF PROGRAMMING LANGUAGE

Pascal - 1970

Named from Blaise Pascal, french mathematician.

Niklaus Wirth.

Language aimed to ease the building of compilers, and to lead teaching by forcing to a structured programming.

HISTORY OF PROGRAMMING LANGUAGE

C - 1973

C is the successor of B, which is the successor of BCPL.

Dennis Ritchie.

It was firstly destinated to program the UNIX operating system, but has become quickly universal thanks to its portability and speed.

HISTORY OF PROGRAMMING LANGUAGE

Sql - 1970+

Standard Query Language

IBM

Language of query for relational databases.
Successor of the Square language.

HISTORY OF PROGRAMMING LANGUAGE

Awk - 1974

From the first letters of authors' names.

Aho, Kerninghan, Weinberger

Word processing language based on regular expressions, using a pattern-action principle.

HISTORY OF PROGRAMMING LANGUAGE

Ada - 1980+

From the nickname of Ada Byron de Lovelace, first woman to program.

Designed by a committee.

Inspirated by Pascal and Algol W. Rather heavy.
Introduces GENERICITY of algorithms and a kind of primitive object orientation, but will become really object oriented later.
Introduces PACKAGES, that are independent modules.

HISTORY OF PROGRAMMING LANGUAGE

C++ 1981-1986

Bjarne Stroustrup.

Object oriented version of C.
Introduces OPERATOR OVERLOADING.
Methods may be inline.

Further, multiple inheritance and template (generic classes or functions) has been implemented.

HISTORY OF PROGRAMMING LANGUAGE

Java - 1994

Java (coffee)

James Gosling and other programmers at Sun

Conceived at the beginning, in 1991, as an interactive language named Oak, was unsuccessful. But in 1994 has been rewritten for Internet and renamed Java.

HISTORY OF PROGRAMMING LANGUAGE

PHP - 1995

Personal Home Pages Hypertext Processor

Rasmus Lerdorf

Multi-platform scripting language, embedded inside Html.

HISTORY OF PROGRAMMING LANGUAGE

Scriptol - 2001

Scriptwriter Oriented Language

Denis Sureau

The most recent, the most powerful among procedural languages. Scriptol is either compiled in PHP or in C++ or native, giving it a great portability. It is both a language for applications, for scripting and to make dynamic web pages.

HISTORY OF PROGRAMMING LANGUAGE

THE FUTURE

Some trends:

•**Scripting languages**

- Several modern scripting languages offer a simple, natural syntax: NetRexx, Ruby, Python, Scriptol. Python is the most widely used for now. Scriptol just starts.

HISTORY OF PROGRAMMING LANGUAGE

THE FUTURE

- **Internet languages**

- These languages allows to embed code inside html page and thus to combine statements and data. Php, Asp, JavaScript are the most used ones. Future plateforms as .Net will allow any language to be embedded into data.

HISTORY OF PROGRAMMING LANGUAGE

THE FUTURE

- **Markup languages**

- The most recent trend is to turn xml documents into executables.

- Starting with version 4.1, scriptol embeds xml into scriptol sources as a data structure, that is usable by any statement in the source. That's is a next step beyond object-oriented programming.

HISTORY OF PROGRAMMING LANGUAGE

THE FUTURE

- There are at least two projects to define statement as xml tags belong data and execute the xml code with an interpreter. SuperX++ and Steam-Water that uses conciseXML a simplified superset of xml and currently it has a Java interpreter (slow).

HISTORY OF PROGRAMMING LANGUAGE

Conclusion

The .Net or compatible platforms will ease to put code inside data, but xml may be an alternative. C# will be a leader language of such platform at start, but its success will come that programmers are used with the C++ and Java syntax. As the platform allows to use any language with common resources, it will permit new and powerful languages to emerge. Other trends are higher level for languages, in programming by aspects, or by schemas with uml and further concepts.