CS403/503
Programming Languages

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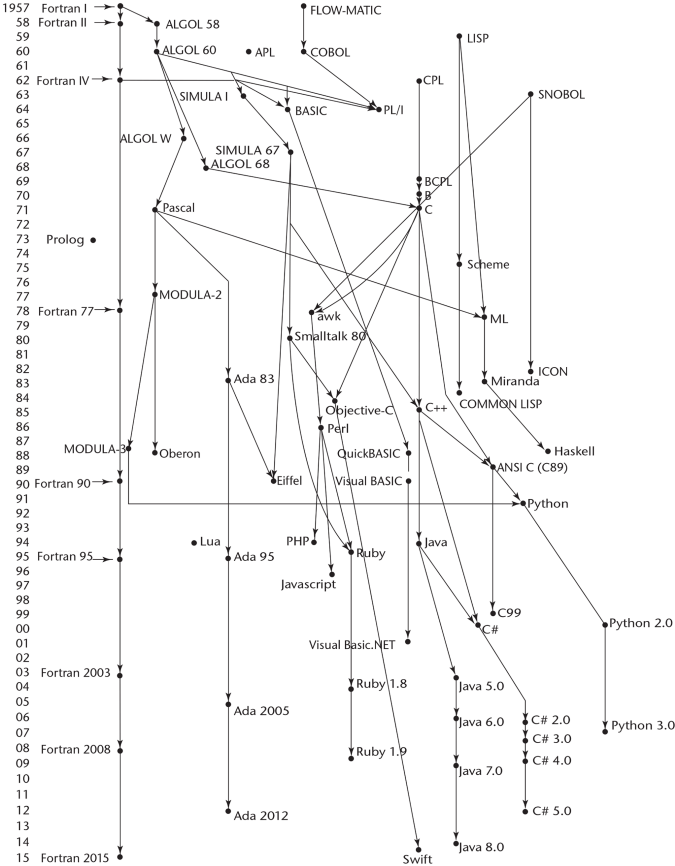
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Office Hours: 12:30-1:30pm MWF
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Programming Languages

- Top 5 most popular languages of 2019 by TIOBE(The importance of being earnest)

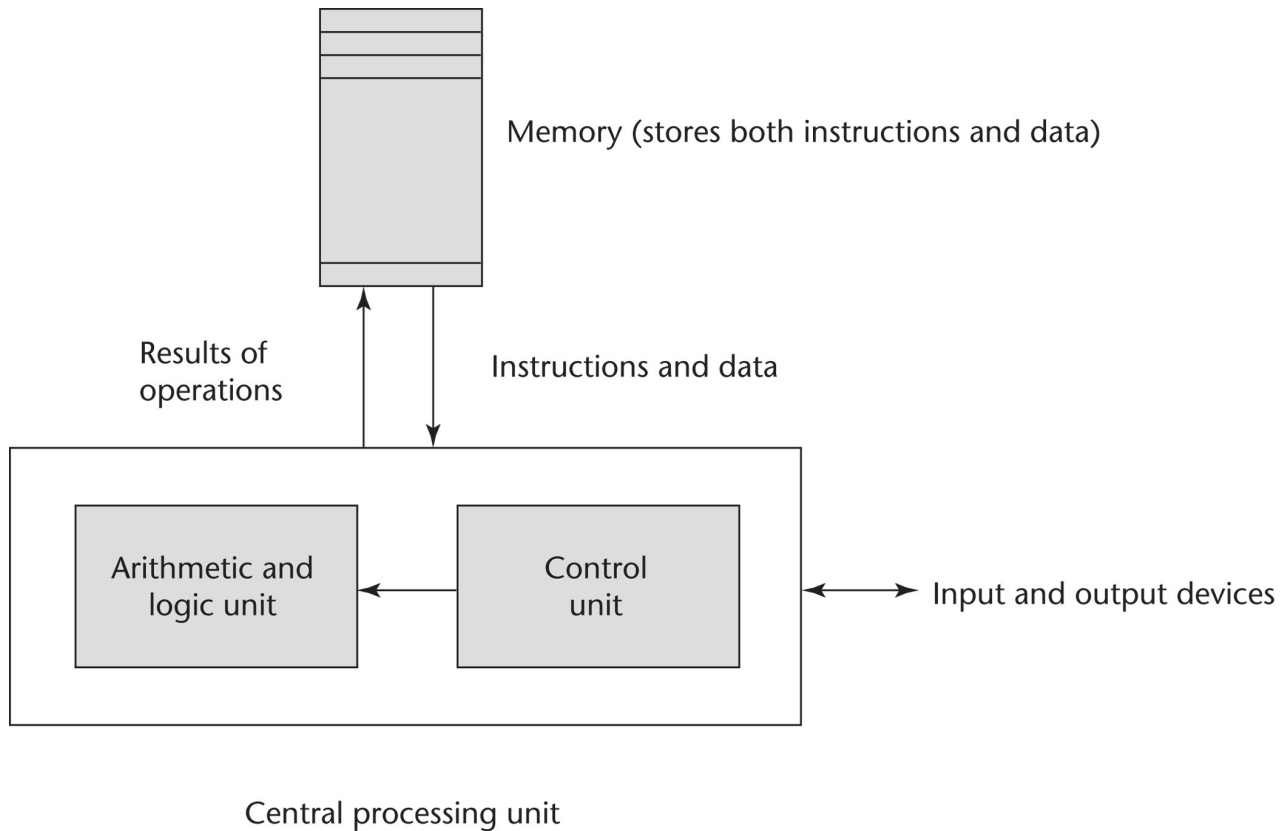- *Java*

- *C*

- *Python*

- *C++*

- *C#*

Programming Languages

1957 Fortran I
58 Fortran II
59
60
61
62 Fortran IV
63
64
65
66
67
68
69
70
71
72
73 Prolog
74
75
76
77
78 Fortran 77
79
80
81
82
83
84
85
86
87 MODULA-3
88
89
90 Fortran 90
91
92
93
94
95 Fortran 95
96
97
98
99
00
01
02
03 Fortran 2003
04
05
06
07
08 Fortran 2008
09
10
11
12
13
14
15 Fortran 2015

ALGOL 58
ALGOL 60
APL
FLOW-MATIC
COBOL
LISP
CPL
SNOBOL
SIMULA I
BASIC
PL/I
ALGOL W
SIMULA 67
ALGOL 68
BCPL
B
C
Pascal
Scheme
MODULA-2
awk
ML
Smalltalk 80
Ada 83
ICON
Miranda
COMMON LISP
Objective-C
C++
Perl
QuickBASIC
Oberon
Haskell
Eiffel
Visual BASIC
ANSI C (C89)
Python
Lua
PHP
Ada 95
Ruby
Java
Javascript
C99
C#
Python 2.0
Visual Basic.NET
Ruby 1.8
Java 5.0
Ada 2005
Java 6.0
C# 2.0
Python 3.0
C# 3.0
Ruby 1.9
Java 7.0
C# 4.0
Ada 2012
C# 5.0
Java 8.0
Swift

Language Categories

- *Imperative*
- *Functional*
- *Logical*
- *Object-oriented*

Imperative Programming

Memory (stores both instructions and data)

Results of operations

Instructions and data

Arithmetic and logic unit

Control unit

Input and output devices

Central processing unit

The *von Neumann* architecture

Functional Programming

- Mathematical functions: $y=f(x)$, $z=f(x, y)$, $y=|x|$
- Function composition: `h (x) ≡ f ( g ( x))`
- Map
- Recursion

Logical Programming

- Rule-based (rules are specified in no particular order)

```
parent(X,Y):- mother(X,Y).
parent(X,Y):- father(X,Y).
grandparent(X,Z):-
parent(X,Y), parent(Y,Z).
```

Object-oriented Programming

- Encapsulation

- Inheritance

- Polymorphism, `I, (state your name), do solemnly swear ……`
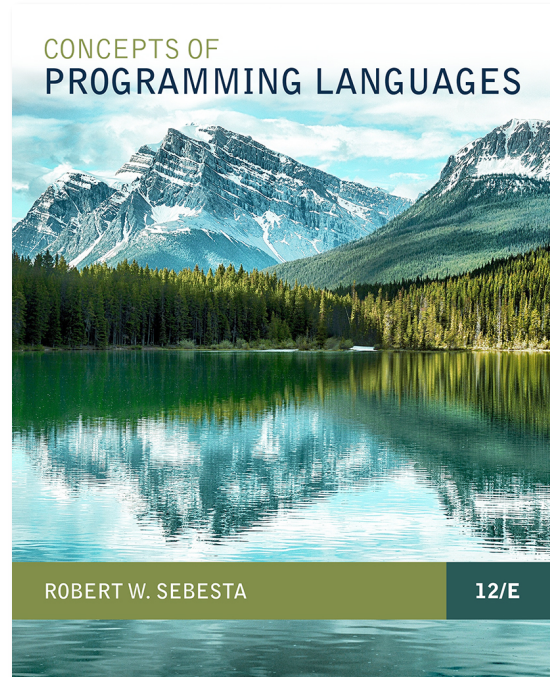
Language Constructs

- Variables

- Expression and assignment

- Control structures

- Functions

- ……

Course Objectives

- *Distinguish different categories of programming languages*
- *Identify necessary constructs in a programming language*
- *Understand how a programming language is implemented*
- *Write programs in different programming languages*
- *Choose a programming language suitable for solving a specific problem*
- *Learn a new programming language quickly and accurately*

Textbook

- Robert W. Sebesta, Concepts of Programming Languages, 12/E, Pearson, 2019, ISBN 0-13-499718-2

Misc

- Course Info: Blackboard
- Syllabus