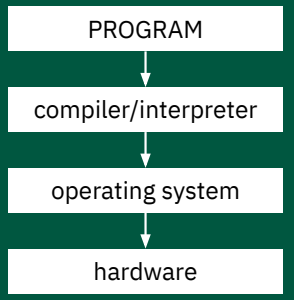
CMSC 124

Design and Implementation of Programming Languages

Kristine Bernadette Pelaez
Institute of Computer Science
University of the Philippines Los Baños

Language Implementation Methods



Implementation ***Methods***

1. Compilation
2. Interpretation
3. Hybrid Systems

1. Compilation

1. Compilation

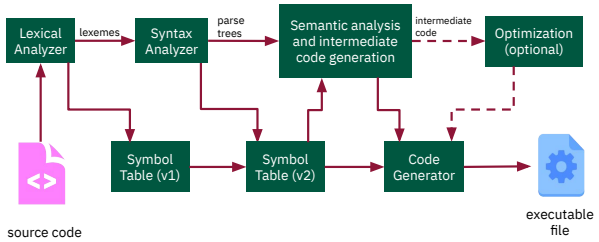
programs are translated to *machine code*

1. Compilation

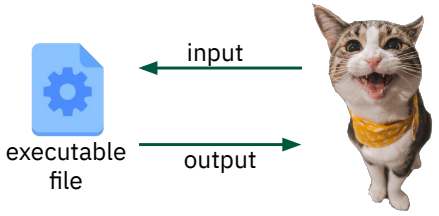
Examples:

`C, C++, COBOL`

1. Compilation



1. Compilation



fastest among the methods of *implementation*

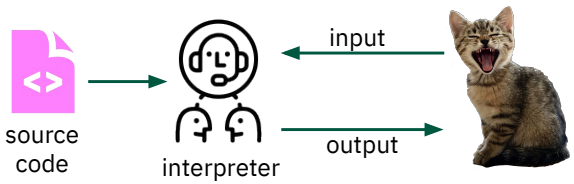
the *von Neumann bottleneck* limits the speed of programs

2. Interpretation

programs are interpreted by another program called *an interpreter*

lexical, syntax, & semantic analysis are still done but *no translation to machine code happens*

statements are decoded and executed *one by one*



Examples:
`Python, PHP, JavaScript`

this method is *easier to implement*

2. Interpretation

allows *easier source-level debugging* since statements are interpreted one by one

2. Interpretation

however, it is
10 *to* 100 *times slower*

2. Interpretation

```
for subj in courses:
    print("Grade in",subj)
    input("Grade:")
```


2. Interpretation

speed is affected by
how fast the interpreter can decode a statement

3. Hybrid Implementation Systems

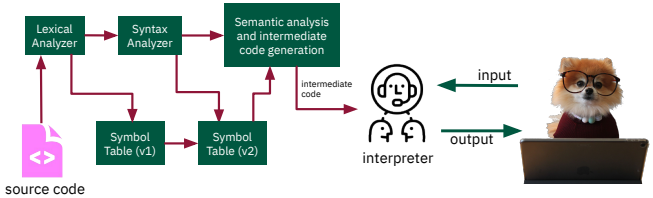
3. Hybrid Implementation Systems

a *compromise* between compilers and interpreters

3. Hybrid Implementation Systems

source code is *translated* to an *intermediate language* that is easier to *interpret*

3. Hybrid Implementation Systems



3. Hybrid Implementation Systems

faster than interpretation since statements are *decoded only once*

Examples:
`Perl, Java`

Preprocessors

accepts a *program as input* and returns the *modified version as output*

a program that *processes a program before it is compiled*


```
#include <stdio.h>
#ifdef QUEUE_H
#define TRUE 1
#endif
```


CMSC 124

Design and Implementation of Programming Languages

Kristine Bernadette Pelaez
Institute of Computer Science
University of the Philippines Los Baños