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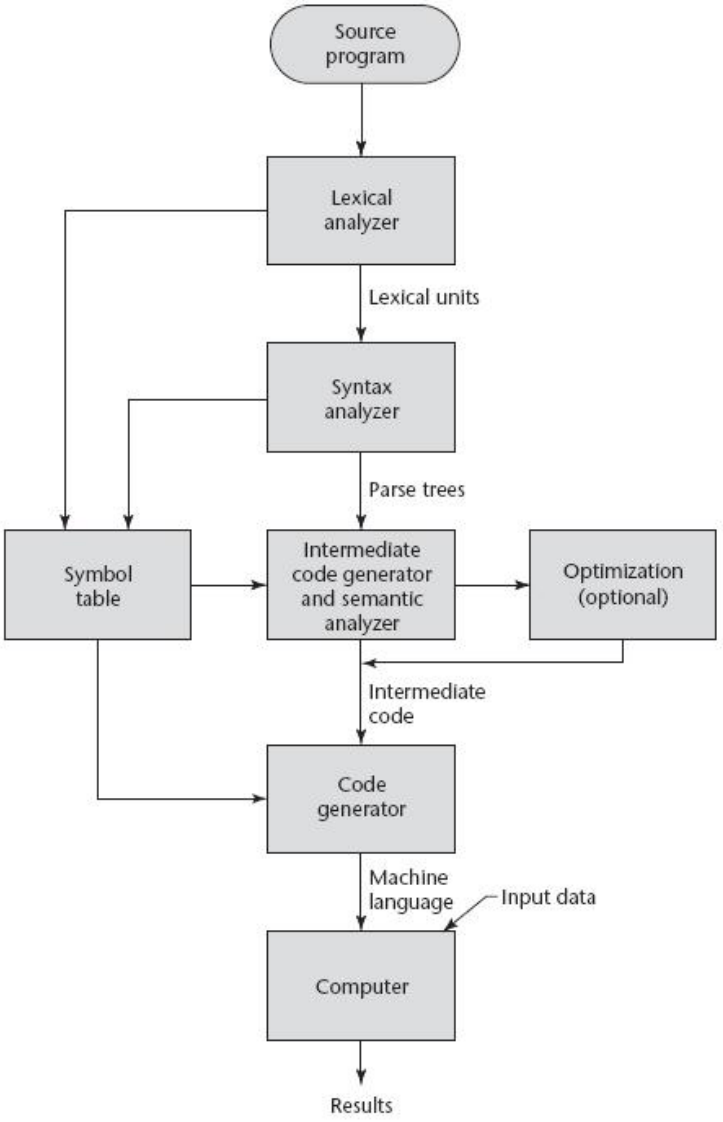
Examine the following diagram:

Figure 1.3
The compilation process



Answer the following questions based on figure 1.3:

1) Explain the strengths of the architecture?

1. The structure ultimately translates the program into machine language, so once the translation is complete, the program executes very quickly.

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2. The structural process is clearly delineated and cascaded. Words are first identified and categorized through lexical analysis, then syntactic analysis through grammatical analysis, and semantic review through semantic analysis.
3. Storage of information generated by lexical and syntactic analyzer through symbol tables.
4. This structure ultimately generates machine code, executable files, which helps to protect the source files.
5. The structure can link system programs to complete the input and output, and the structure translates the entire file at once.

2) Explain the weaknesses of the architecture?

1. It is time-consuming because the substructure has to perform lexical analysis, syntactic analysis, and semantic analysis on the source program at one time.
2. This structure eventually generates machine code, which is less portable.

3) Explain which areas can be modified to enhance the speed of a computer? Be specific on which areas of the computer would need to change.

1. Syntax analyze.Optimize its algorithm and reduce its complexity.
2. Optimization, as many types of optimizations are difficult to perform on machine languages, most optimizations are done on intermediate code.

Areas of computer: Memory and processor connection speed, improving the hardware performance of these two components.

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Analyze the following diagram:

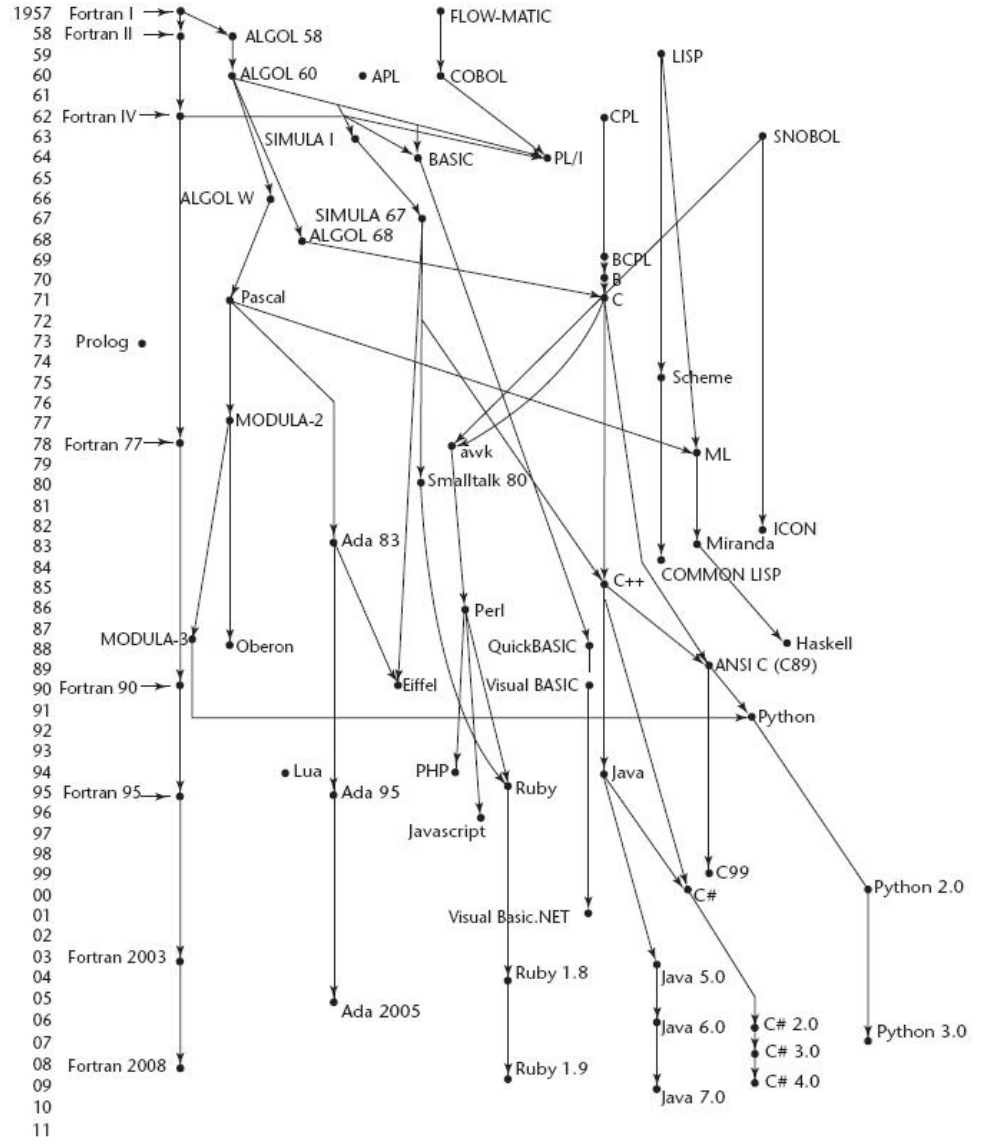

Figure 2.1

Genealogy of common high-level programming languages

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Answer the following questions base on figure 2.1:

1) Which language has the most other languages derived from it?
    a. Why do you think this is the case?

ALGOL60

ALGOL 60 was a great success; Every imperative programming language designed since 1960 owes something to ALGOL 60. In fact, most are direct or indirect descendants; examples include PL/I, SIMULA 67, ALGOL 68, C, Pascal, Ada, C++, Java, and C#.

2) Which language has the least other languages formed from it?
    a. Why do you think this is the case?

COBOL

Although it has been used for nearly 60 years, COBOL has had little effect on the design of subsequent languages, except for PL/I. Few have attempted to design a new language for business applications since COBOL appeared.

So it has the least other language formed from it.

Prolog

Programs written in logic languages thus far have proven to be highly inefficient relative to equivalent imperative programs. And it is an effective approach for only a few relatively small areas of application.

APL

APL programs is difficult to read. People think of APL as a language that is best used for “throw-away” programming. Although programs can be written quickly, they should be discarded after use because they are difficult to maintain.

3) Which 5-year period had the largest increase in programming languages?
    a. What was going on in the world at that time to influence this increase?

1990-1995

The rapid growth of the Internet in the mid-1990s was the next major historic event in programming languages. By opening up a radically new platform for computer systems, the Internet created an opportunity for new languages to be adopted.

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Theoretical questions:

1) Programming languages are evaluated based on Readability, Writability, Reliability, and Cost. Choose a programming language of your choice and discuss how the 4 factors apply to the evaluation of that language.

1. Readability

Python is a simple and very good to use programming languages it is easy to understand most especially in the beginners of programming. It has incredibly compact language syntax, in that functions and classes tend to take very little vertical space. This makes it much easier to understand functions at a glance.

Example in python

```
>>>' hello world! '
Hello world!
```

Example in java:

```
import java.io.*;
public class Hello
{
public static void main ( String[]
args)
{

System.out.println ("Hello World!
\n");
}
}
```

2. Writability

python is an easy writing language it has an ability for the function to return more then one parameter and we all know how useful that is. Its automatic memory management allows you to write code without the worry overflow or out or stack errors. It also has a very clear flow from top to bottom that allows easy writing of the code.

Example in Python:

```
str1 = raw_input("Player 1, please enter your name: ")
print str1
str2 = raw_input("Player 2, please enter your name: ")
```

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```
print str2
print 'Computer: ' + 'player1' + ' and ' + 'player2' + ' I have a
series of random\njumble words can you guest it?'
print 'Players (Y/N)?: '
```

In java:

```
BufferedReader buffer = new BufferedReader(new
InputStreamReader(System.in));

String jumbleWords[];

System.out.print("Player 1, please enter your name: ");
String player1 = buffer.readLine();
System.out.print("Player 2, please enter your name: ");
String player2 = buffer.readLine();

System.out.println();
System.out.println("Computer: " + player1 + " and " + player2
+ " I have a series of random\njumble words can you guest it?");

}
```

3. Reliability

Python is obviously a highly reliable language. It, being an easily read language, is better able to be debugged should a error creep into the programming . Python can be run in an interpreter as well as an executable and its use of standardized libraries allow more people to use the same set of code to insure that he program runs correctly.This also makes the language easier to learn.

4. Cost

The fact that python is so easily read and written makes it cost less in time and man hours spent writing and debugging code written in python. The lower the cost of using a language can also effect the reliability of a language. For instance if you get your code written in python for one half or one third of the cost to get it written in java then you have all that much more to sink into the program. It is also free to use python compilers, find sample source code and get multiplatform help online because of the fact that it is all open source and can download to the internet and can install in the computer fast.

5. Portability

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Python portability were used to various different operating system's like Mac, Linux , windows, python becomes highly reliably to web based programmers. No wonder it is widely used by famous sites like google and yahoo.com. Python also combines by any other languages like java example the jython in java + python, cython for C with python and also pypar for parallelize combination with python.

Reference:

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2. 编译器结构_百度百科 (baidu.com)
3. https://ieeexplore.ieee.org/abstract/document/9689813