Lecture 2

Compiler Design

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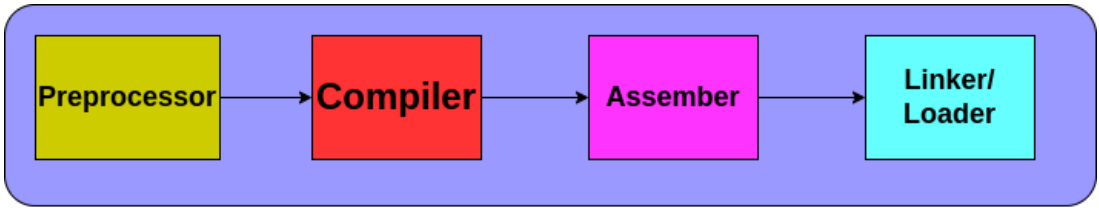
Basic flow



- `gcc --save-temps fileName.c` → it will save all the temporary files being created in process of compilation of c file.

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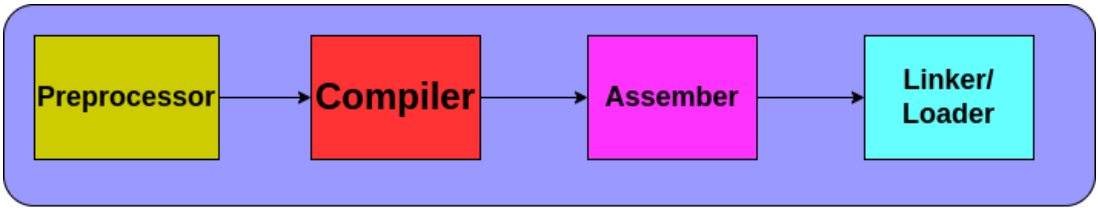

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- Preprocessing: includes header file and macro expansion.

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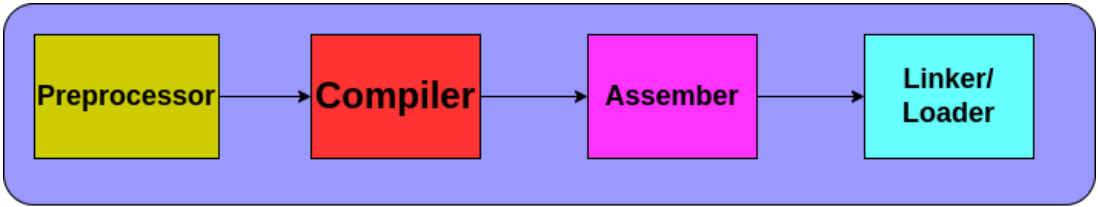

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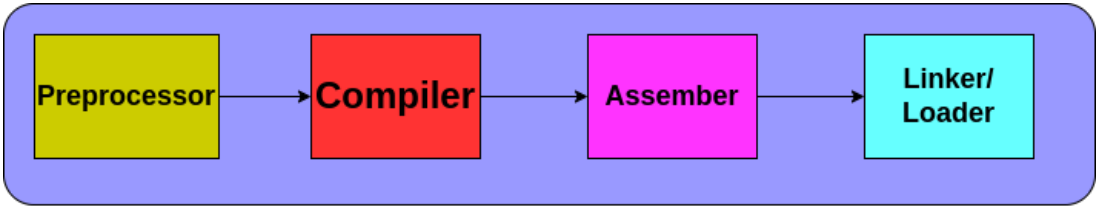

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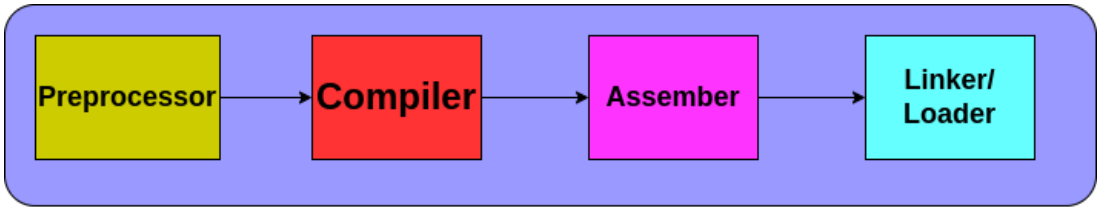

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- Compiler: generate assembly file
- Assembler: generate the relocatable object file
- Linker/loader: link different object files into a single binary. Load it to the main memory.

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- Design a series of program representations
- Intermediate representations should be amenable to program manipulation of various kinds (type checking, optimization, code generation etc.)
- Representations become more machine-specific and less language-specific as the translation proceeds

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  - English language words can be found in dictionaries
  - Programming languages have a dictionary (keywords etc.) and rules for constructing words (identifiers, numbers etc.)

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  - `if a == b then a = 1 ; else a = 2 ;`
  - Sequence of words (total 14 words)
    `"if", "a", "==", "b", "then", "a", "=", "1", ";", "else", "a", "=", "2", ";",`

total 14 tokens are present in the given statement.

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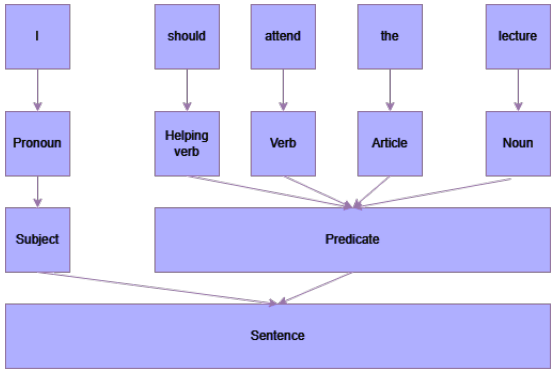
checking if the given statement is structurally correct or not.



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"his" corresponds to whom?

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- Is this correct? `a = b + c;` based on **C** Programming Language

will depend on the declaration types of variables a, b and c and compiler (do compiler allow different types to be added together or not)

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Code motion, also known as frequency reduction,

when doing only copying of some variables like b = a and then using b instead of a, then replace b with a until b's or a's value gets changed.

replace the value of constant to where it has been used in the program at compile time only

$$PI = 3.14159$$
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$$X = R * R$$
$$Area = 12.56636 * X$$
$$Volume = 4.18879 * X * R$$