**Faculty of Science**

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**Compiler**

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# What is compiler?

Is a software to take source code of specific programming language and execute a number of tasks on it to produce machine language in the format of executable file.

# What are the phases of compiler?

### Lexical Analysis: This phase scans the source code as a stream of characters and converts it into meaningful lexemes ”token”.

### Syntax Analysis: It takes the token produced by lexical analysis as input and generates a parse tree.

### Semantic Analysis: In This phase checks whether the parse tree constructed follows the rules of language.

### Code Optimization: Optimization can be assumed as something that removes unnecessary code lines, and arranges the sequence of statements in order to speed up the program execution without wasting resources (CPU, memory).

### Code Generation: The code generator translates the intermediate code into a sequence of (generally) re-locatable machine code. Sequence of instructions of machine code performs the task as the intermediate code would do.

# What is the difference between compiler and interrupter?

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| Interpreter | Compiler |
| Translates program one statement at a time. | Scans the entire program and translates it as a whole into machine code. |
| It takes less amount of time to analyze the source code but the overall execution time is slower. | It takes large amount of time to analyze the source code but the overall execution time is comparatively faster. |
| No intermediate object code is generated, hence are memory efficient. | Generates intermediate object code which further requires linking, hence requires more memory. |
| Continues translating the program until the first error is met, in which case it stops. Hence debugging is easy. | It generates the error message only after scanning the whole program. Hence debugging is comparatively hard. |
| Programming language like Python, Ruby use interpreters. | Programming language like C, C++ use compilers. |

# What is the difference of compiling and execution?

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| Executing | Compiler |
| Uses users inputs to execute a certain task | Uses a source to be converted to machine language. |
| The output should be a results based on user input or logic error. | The output may be syntax or logic error if the code is not right. |