

Programming Or Implementation Phase

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Programming Or Implementation Phase

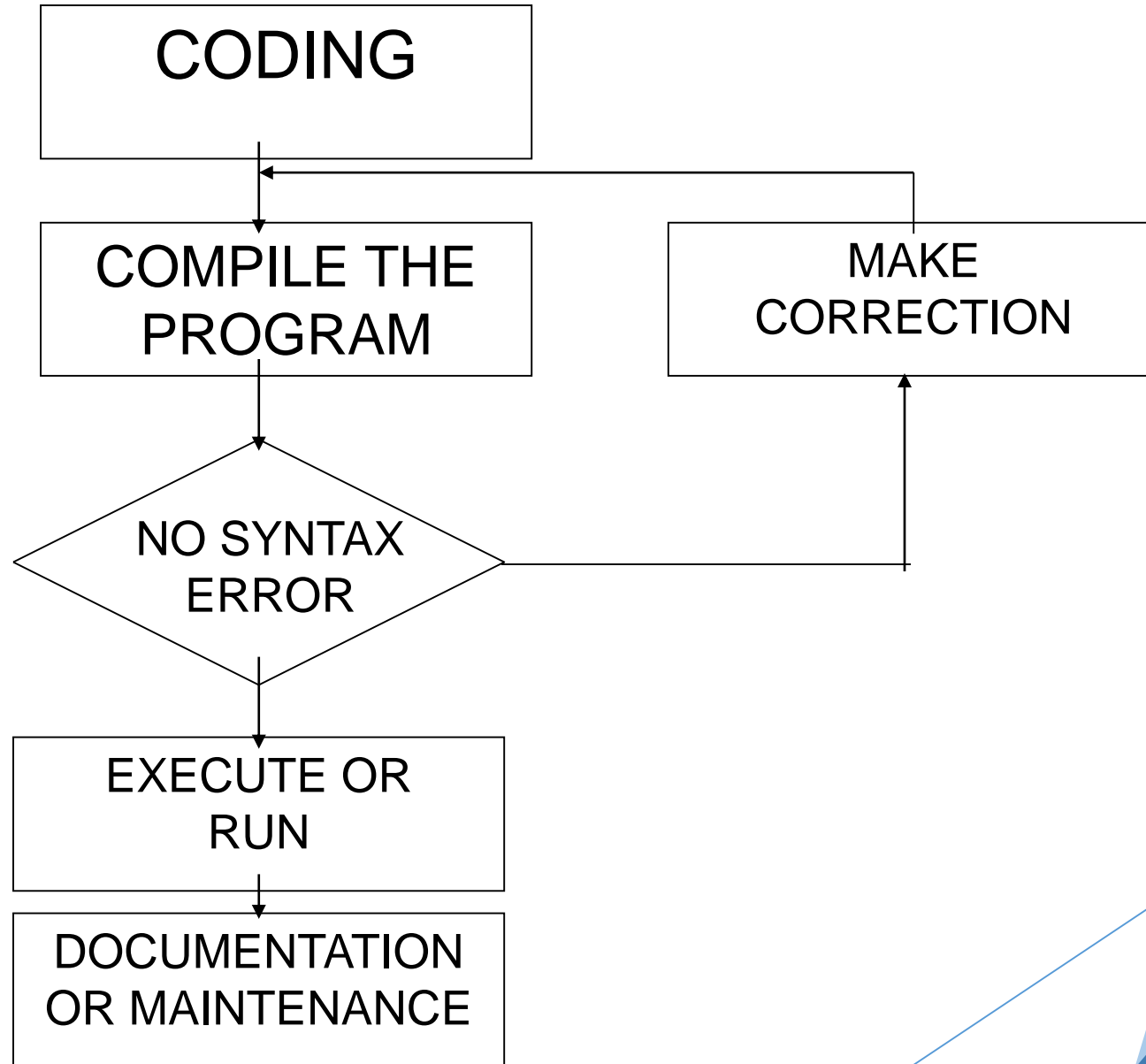
Transcribing the logical flow of solution steps in flowchart or algorithm to program code and run the program code on a computer using a programming language.

Programming phase takes 5 stages:

- Coding.
- Compiling.
- Debugging.
- Run or Testing.
- Documentation and maintenance.

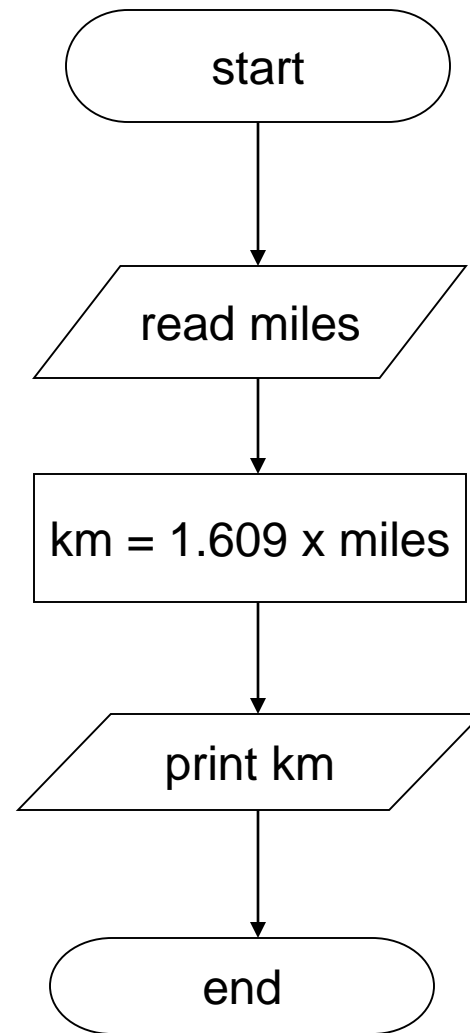
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- Once the program is coded using one of the programming language, it will be compiled to ensure there is no syntax error. Syntax free program will then be executed to produce output and subsequently maintained and documented for later reference.



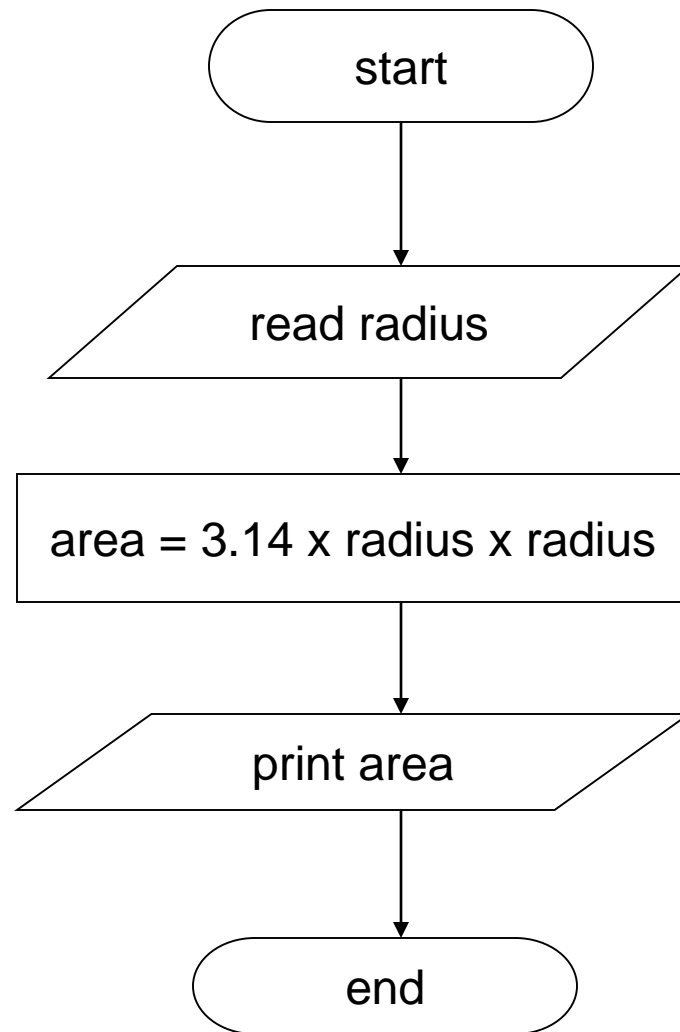
Problem 1

Write a Problem Analysis Chart (PAC) to convert the distance in miles to kilometers where 1.609 kilometers per mile.



Problem 2

Write a Problem Analysis Chart (PAC) to find an area of a circle where $\text{area} = \pi * \text{radius} * \text{radius}$



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Coding

- Translation or conversion of each operation in the flowchart or algorithm (pseudocode) into a computer-understandable language.
- Coding should follow the format of the chosen programming language.

Many types or levels of computer programming language such as:

- Machine language
- Symbolic language or assembly language
- Procedure-oriented language

The first two languages are also called low-level programming language. While the last one is called high-level programming language.

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✓ Machine Language

- Machine language uses number to represent letters, alphabets or special character that are used to represent bit pattern.
- Example:

an instruction to add regular pay to overtime pay, yielding total pay might be written in machine language as follows:

16 128 64 8

in which 16 is a code that mean ADD to the computer. The 128 and 64 are addresses or location at which regular pay and overtime pay are stored. The 8 represents the storage location for the total pay.

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Sometimes, bit pattern that represent letters and alphabets are used for coding.

Example:

Instead of:	16	128	64	8
Use:	10000	10000000	1000000	1000

This representation is ideal for a computer but difficult and tedious to the programmer to write a lengthy program.

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✓ Symbolic Language or Assembly Language

A symbolic language or assembly language is closely related to machine language in that, one symbolic instruction will translate into one machine-language instruction.

Contain fewer symbols, and these symbols may be letters and special characters, as well as numbers.

As example, a machine language instruction

16 128 64 8

can be rewritten in assembly language as

ADD LOC1 LOC2 LOC3

Which means, add content of location LOC1 to location LOC2 and put the result in location LOC3.

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✓ Procedure - Oriented Language

- Programmer has to know the computer hardware before he can write program in machine and assembly language. It means the language is machine dependent.
- Using procedure - oriented language, the programmer can run the program in any computer hardware.
- A special program called a *compiler* will translate program written using procedure - oriented language to machine language.

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- Some example of the language:
- COBOL (COmmon Business Oriented Language)
- FORTRAN (FORmula TRANslation)
- Pascal
- C
- C++
- BASIC, etc.
- These languages are also called *high-level programming language*

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Computer Language	Instruction Format
Machine language	16 128 64 8
Assembly language	ADD LOC1 LOC2 LOC3
BASIC	LET T = R + 0
FORTRAN	TOTAL = RPAY + OPAY
COBOL	ADD RPAY, OPAY GIVING TOTAL
Pascal	TOTAL := RPAY + OPAY
C	TOTAL = RPAY + OPAY

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✓ **Compiling and Debugging**

- Compiling is a process of a compiler translates a program written in a particular high-level programming language into a form that the computer can execute.
- The compiler will check the program code known also as source code so that any part of the source code that does not follow the format or any other language requirements will be flagged as syntax error.
- This syntax error is also called bug, when error is found the programmer will debug or correct the error and then recompile the source code again.
- The debugging process is continued until there is no more error in the program.

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✓ Testing

- The program code that contains no more error is called executable program. It is ready to be tested.
- When it is tested, the data is given and the result is verified so that it should produced output as intended.
- Though the program is error free, sometimes it does not produced the right result. In this case the program faces logic error.
- Incorrect sequence of instruction is an example that causes logic error.

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✓ Documentation and Maintenance

- When the program is thoroughly tested for a substantial period of time and it is consistently producing the right output, it can be documented.
- Documentation is important for future reference. Other programmer may take over the operation of the program and the best way to understand a program is by studying the documentation.
- Trying to understand the logic of the program by looking at the source code is not a good approach.
- Studying the documentation is necessary when the program is subjected to enhancement or modification.
- Documentation is also necessary for management use as well as audit purposes.