

มหาวิทยาลัยมหิดล
Mahidol University
Wisdom of the Land

Chapter 1

Introduction to Computer Programming

Narit Hnoohom

EGCO111 Computer Programming

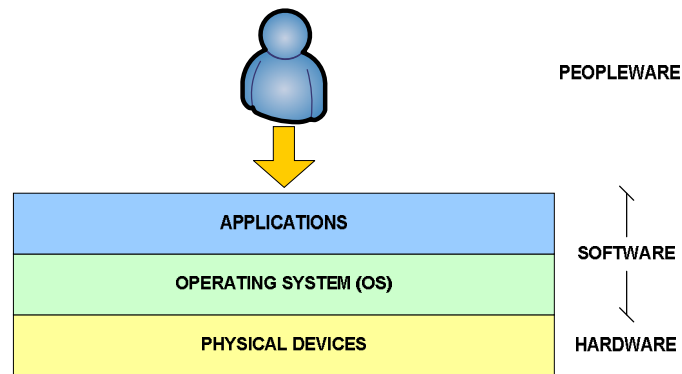
What is computer ?

Computer = Compute + Suffix 'er

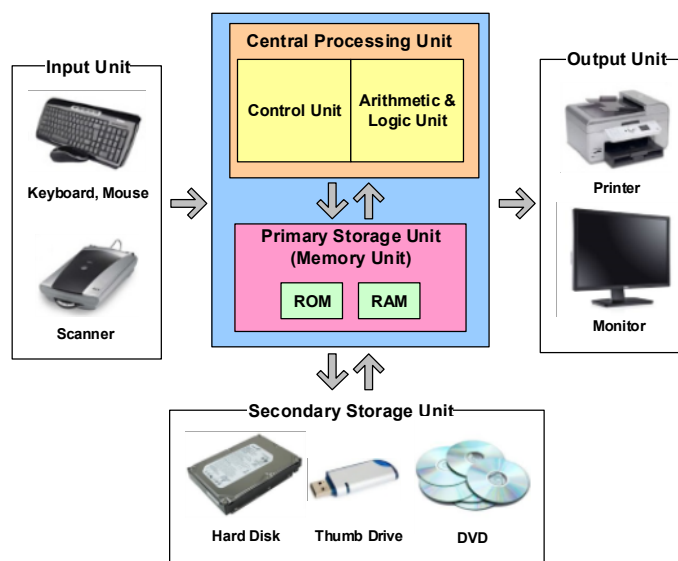
Computer is an equipment for calculation and making logical decision, which it is quickly and more effective than human.

Data are processed by a list of instructions, that is called computer program.

Computer System

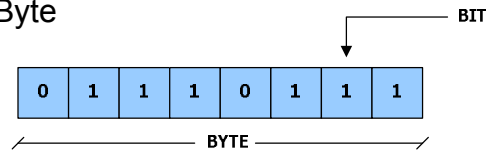


Computer Components



Memory

- Bit & Byte

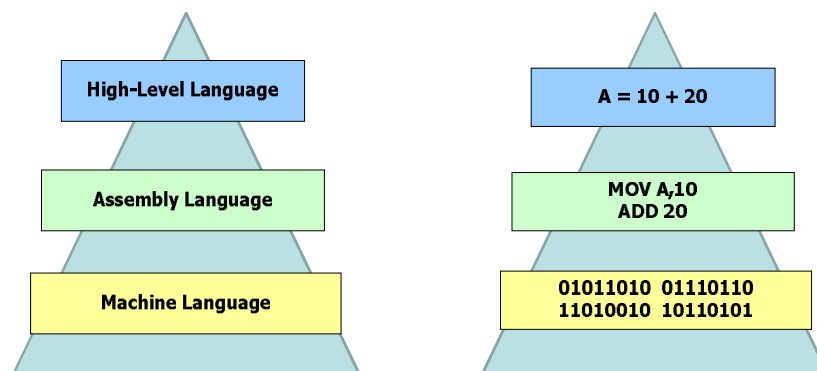


- Content & Address

Content	Address
W	1000
I	1001
N	1002
...	...

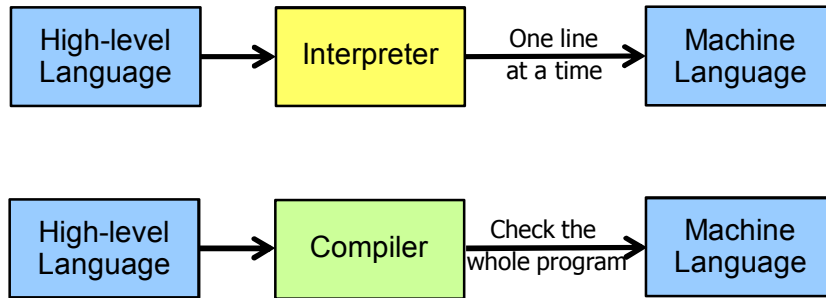
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Computer Languages

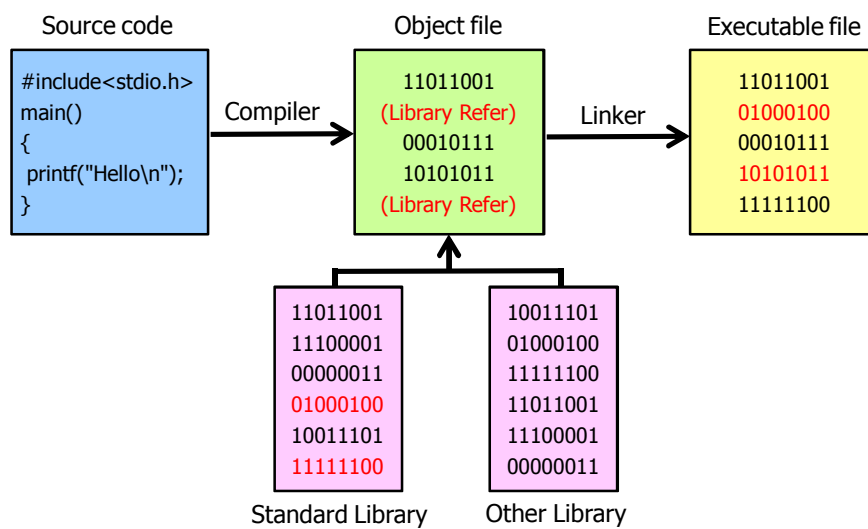


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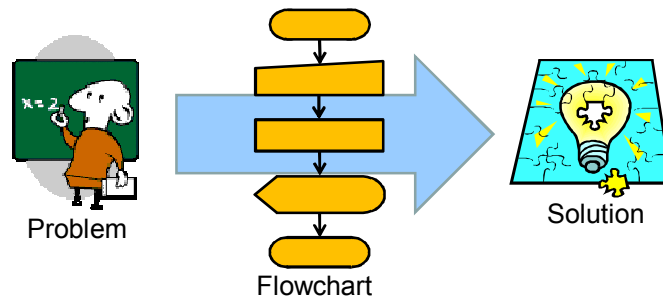
High-level Language Translation



How the C Compiler Work ?



What is Flowchart ?



A flowchart is a symbolic representation of a process, that is illustrated a solution to a given problem.

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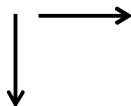
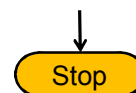
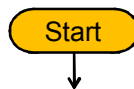
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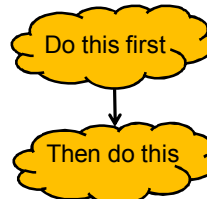
Flowchart Symbols



Start / Stop – denote a starting point or an ending point of a program.



Flow / Direction – indicate flow of steps in a program.



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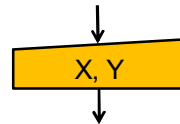
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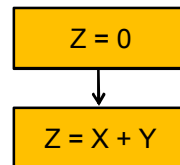
Flowchart Symbols



Get Input – denote input function of any device in a program.



Process – indicate processing of a program.



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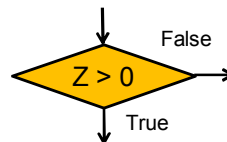
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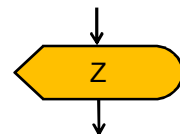
Flowchart Symbols



Decision / Compare – denote a decision making operation in a program. The arrows flowing from the decision symbol are labeled with True, False.



Show Output on Screen – denote output function in a program.



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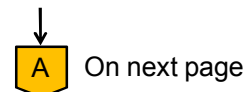
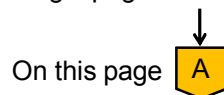
Flowchart Symbols



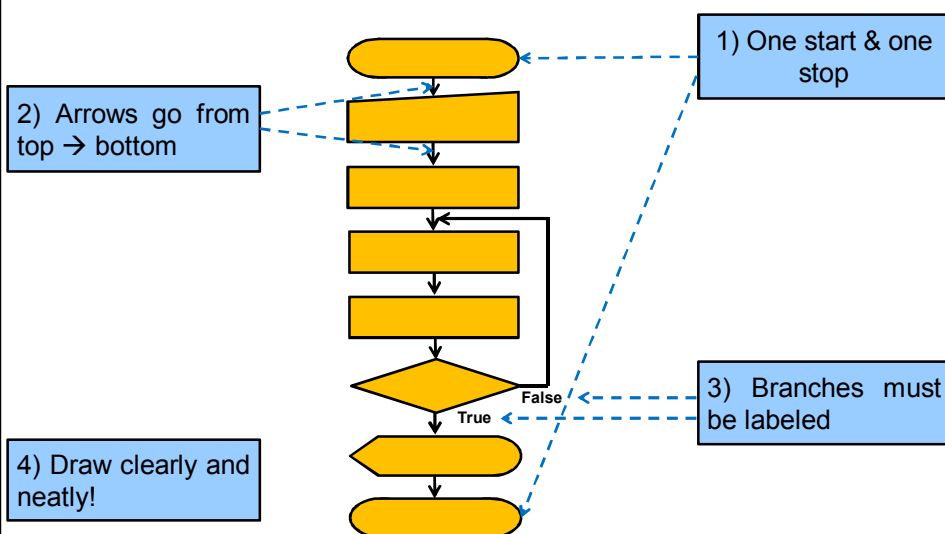
On-Page Reference – indicate link between parts of a flowchart when the flowchart is fit in a single page.



Off-Page Reference – indicate link between parts of a flowchart when the flowchart is unfit in a single page.



Flowchart Rules



Advantages and Disadvantages

- ✓ Analyses the problem effectively
- ✓ Easy to understand the solution
- ✓ ** Guideline for coding **
- ✗ Difficult to make changes
 - Owing to any slight changes in the program will required a new flowchart
- ✗ Not suitable for large program
 - Flowchart will be too large and complicated

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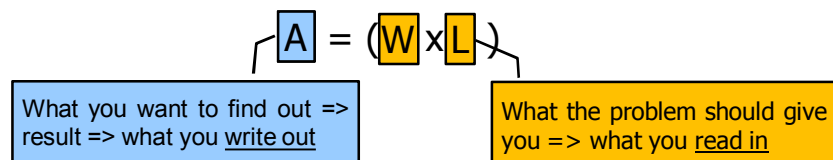
Example of Flowchart

▪ Example1

Problem: Compute the area of rectangle

What you know:

Formula: Area = (Width x Length)



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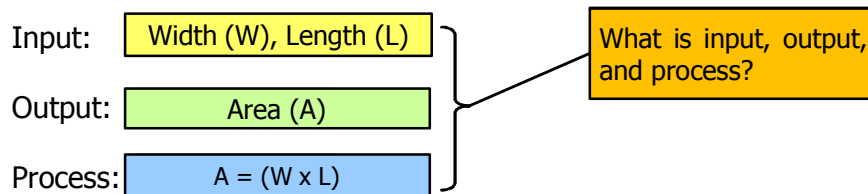
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Example of Flowchart

▪ Example1

Problem: Compute the area of rectangle

What you know:



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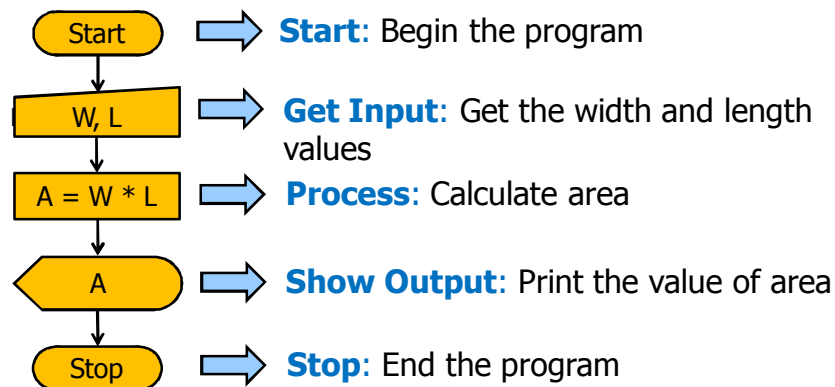
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Example of Flowchart

▪ Example1

Flowchart for computing the area of rectangle.



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Exercise of Flowchart

- **Draw a flowchart to convert temperature from Fahrenheit to Celsius.**
 - Formula: $\text{Celsius} = (\text{Fahrenheit} - 32) \times 5/9$

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Exercise of Flowchart

- **Draw a flowchart to convert a number of days into a number of months and days**
 - Assume 1 month = 30 days

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Modulo

What is modulo ?

The result of a modulo(%) is the remainder of an integer division of the given numbers.

▪ Example 1

$27 / 16 = 1$, remainder 11

$27 \% 16 = 11$

▪ Example 2

$20 / 2 = 10$, remainder 0

$20 \% 2 = 0$

▪ Example 3

$23 / 2 = 11$, remainder 1

$23 \% 2 = 1$

How is the modulo actually computed?

It's known that $a \% b == a - a / b * b$ when a and b are integer numbers, where $a > b$.

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Exercise of Flowchart

- Draw a flowchart to swap the value of two numbers (A and B)

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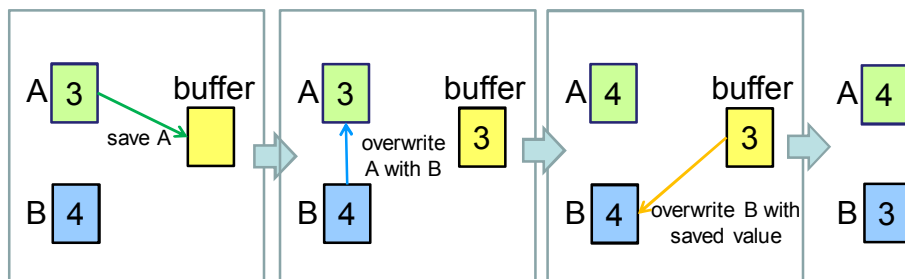
Exercise of Flowchart

Exercise

Problem: Swap the value of two numbers

- From: $A = 3, B = 4$
- To: $A = 4, B = 3$

What you know: we need a buffer!



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Exercise of Flowchart

Draw a flowchart to check whether a number entered is even or odd

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Exercise of Flowchart

- Draw a flowchart to find the largest value of two numbers (A and B)

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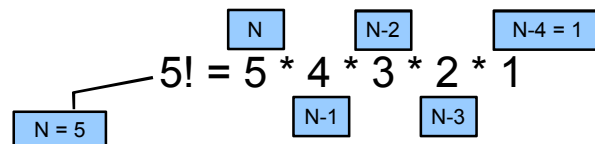
Example of Flowchart

▪ Example2

Problem: Find the factorial of an integer (N)

What you know:

Formula: $FAC = N \times (N - 1) \times \dots \times 1$



Input:
 Output:
 Process:

What is input, output, and process?

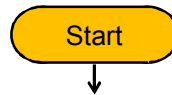
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Example of Flowchart

Example2



Where should we put a decision point?

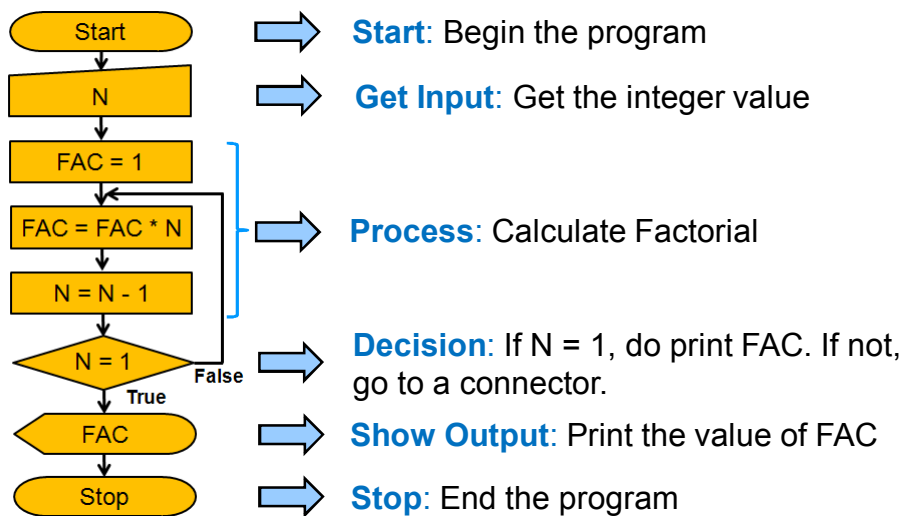
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Example of Flowchart

Example2



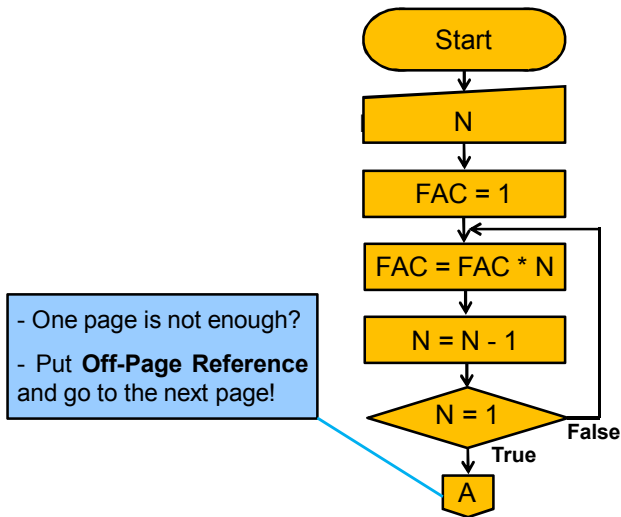
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Example of Flowchart

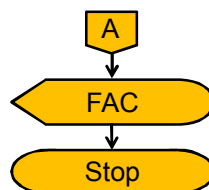
▪ Example2



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Example of Flowchart

▪ Example2



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Example of Flowchart

Example3

Same problem, different method

- One more algorithm that could be used to solve the same problem

Before!, $\text{FAC} = N \times (N - 1) \times (N - 2) \times \dots \times 1$

But also!, $\text{FAC} = 1 \times 2 \times \dots \times N$

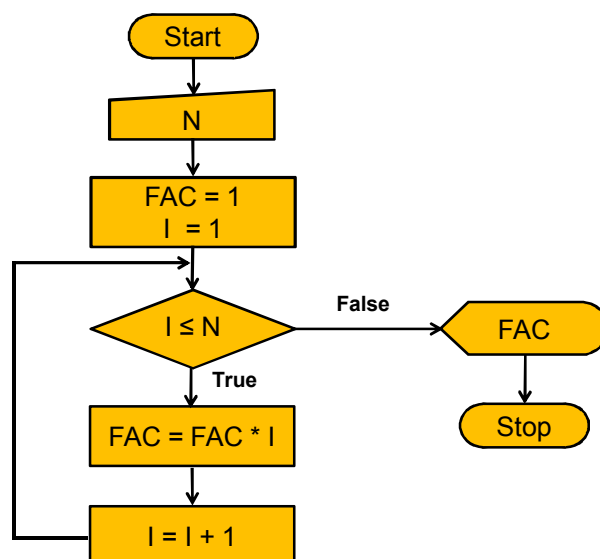
1 st round: 1	FAC = 1 = 1
2 nd round: 1*2	FAC = 1 * 2 = 2
3 rd round: 1*2*3	FAC = 2 * 3 = 6
4 th round: 1*2*3*4	FAC = 6 * 4 = 24
5 th round: 1*2*3*4*5	FAC = 24 * 5 = 120

Q: When to stop?
A: When this is N
(after the Nth round)

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Example of Flowchart



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Exercise of Flowchart

- Draw a flowchart to find the sum of all numbers between 1 to 30

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Exercise of Flowchart

- Draw a flowchart to calculate the student grade according to total marks obtained

Total marks	Grade
> 80	A
71 – 80	B
61 – 70	C
51 – 60	D
< 51	F

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