Introduction to Algorithms and Programming

Lecture 2

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Flow Charts

What Is A Flow Chart?

- It is a graphical representation of an algorithm.
- It demonstrates the way code should be organized.

Flow Charts

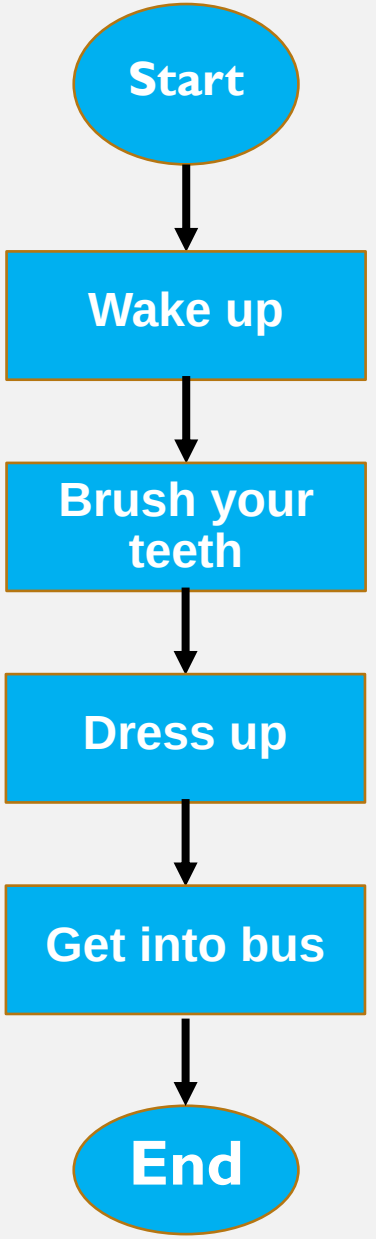
Flow Charts Basics

Symbol	Name	Description
Start/End		Represents the start and end of a process
Arrows		Indicates the direction of the flow
Input/Output		Indicates the process of inputting and outputting data
Process		Captures process step
Condition		Indicates that a decision is required to move forward

Flow Charts

Example 1 - Going To College

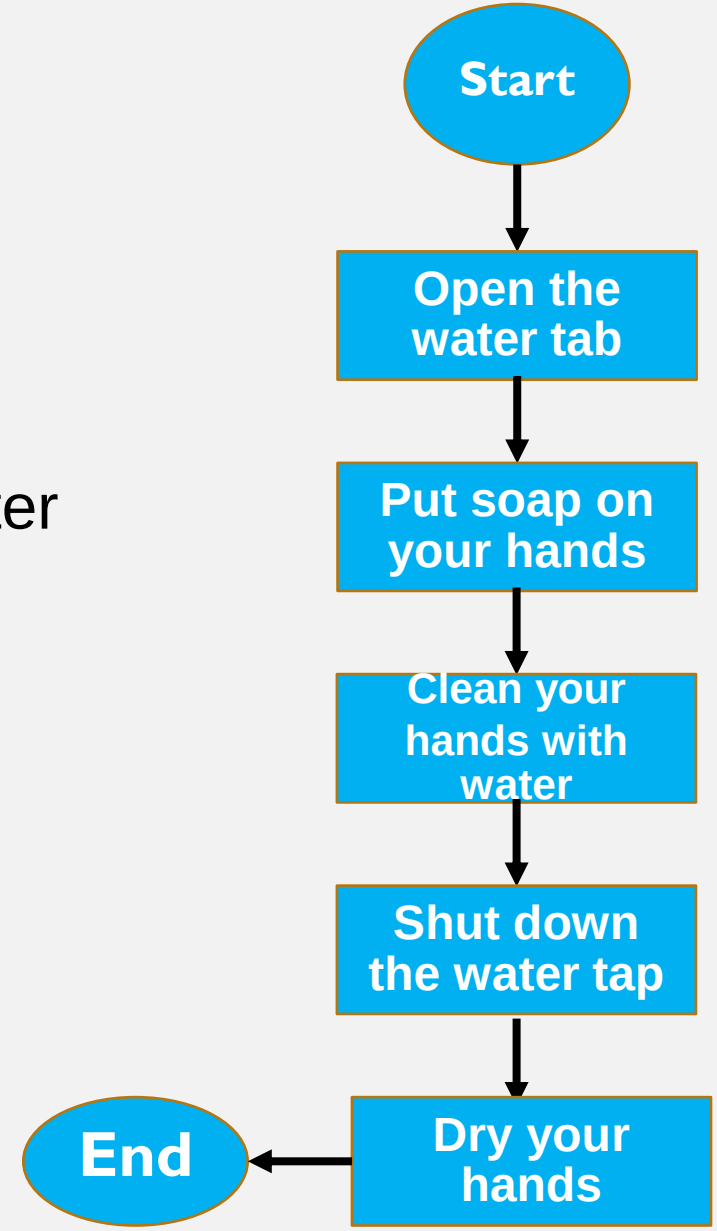
1. Wake up
2. Brush your teeth
3. Dress up
4. Get into bus



Flow Charts

Example 2 - Hand Washing

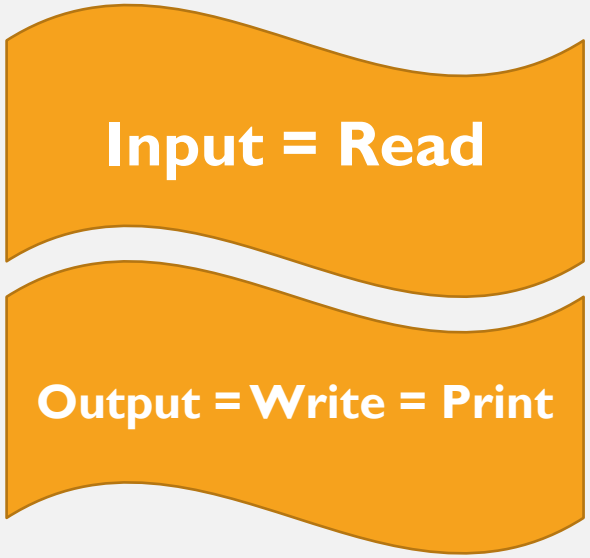
1. Open the water tab
2. Put soap on your hands
3. Clean your hands with water
4. Shut down the water tap
5. Dry your hands

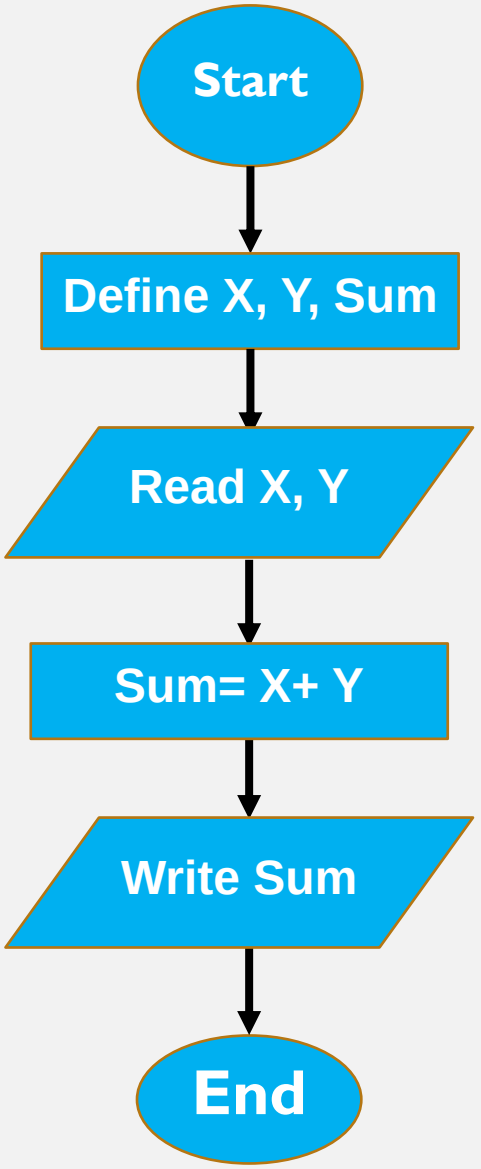


Flow Charts

EXAMPLE 3 - ADDING TWO NUMBER

1. Define variable x, y, sum
2. Read x, y
3. sum = x + y
4. Write sum

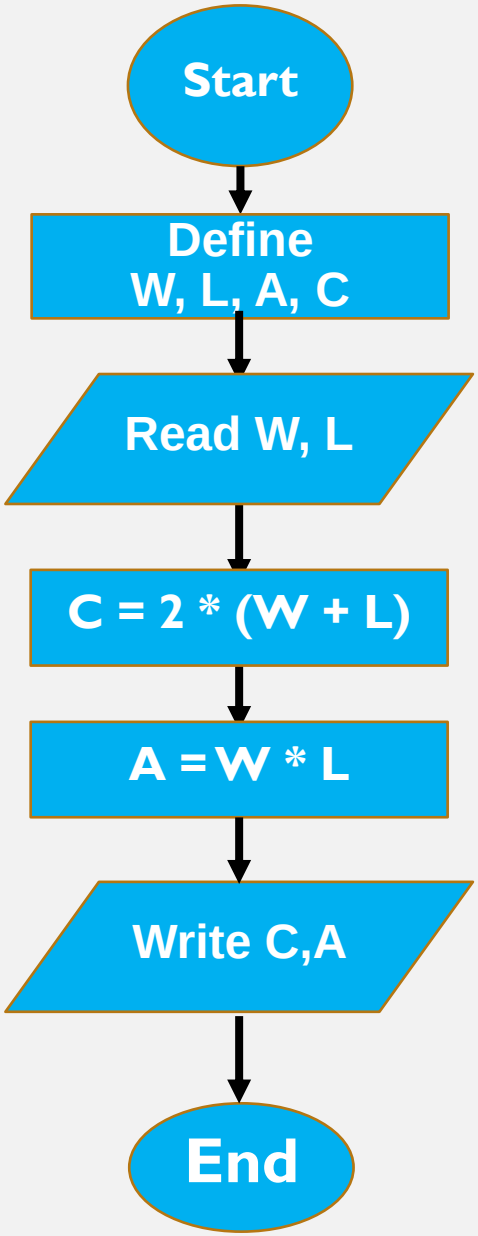




Flow Charts

Example 4 - Circumference And Area Of Rectangle

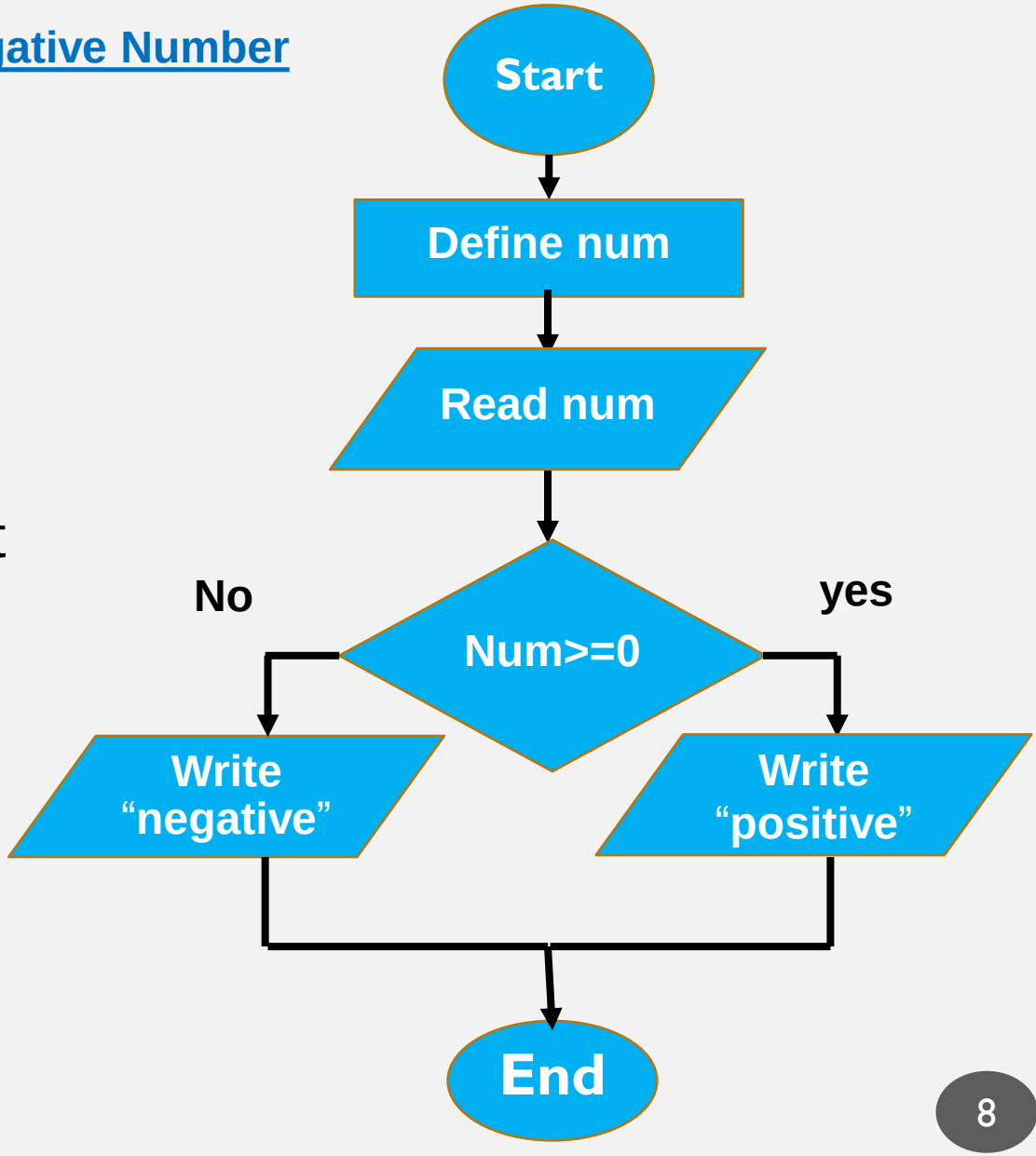
1. Define l, w, c, a
2. Read l, w
3. C = 2 * (w + l)
4. A = w * l
5. Write c, a



Flow Charts

Example 5 - Positive Or Negative Number

1. Define num
2. Read num
3. If num >= 0, then output “positive”
4. Else output “negative”



Assignment

- **Find the largest number among two numbers.**

- **Perform the basic arithmetic operations (+, -, x, /) on two numbers.**

Programming

Main Programming Concepts

We previously discussed the main programming concepts shared between all programming languages:

- **Input**
- **Output**
- **Conditions**

Programming

Input

Inputting in C++ can be expressed as following:

- ***cin >> x;***
- ***cin >> a >> b;***

Programming

Output

Outputting in C++ can be expressed as following:

- ***cout << x;***
- ***cout << x << y;***

Programming

Variables

- **int (integer): -4, -1, 0, 2, 7, …. (4 bytes)**
- **float: -3, -2.5, 0, 5, 9.3, …. (4 bytes)**
- **char: a, b, c, d, …. (1 byte)**
- **string: rama, ahmad, ball, wjd8wh, …. (8 bytes)**
- **bool: true, false (1 byte)**

Programming

Main Function

```
#include <iostream>
using namespace std;
int main()
{



}
```

Include the input/output library

Use the input/output library

Where the code is written

Programming

Example 1:

- Write a program that prints “Hello world!” And “my name is ..”.

```
#include <iostream>
using namespace std;
int main()
{
    cout << "Hello world";
    cout  << "My name is kinda";

    system("pause");
    return 0;
}
```

Programming

Notes

To insert a new line you can use \n or endl

- ✓ **cout << “Hello world! \n”;**
- ✓ **cout << “Hello world!” << endl;**

Programming

Example 2:

- Make the program more interactive by allowing the user to enter their first name then print:

“Hello {{name}}

Welcome to C++ world!”.

```
#include <iostream>
using namespace std;
int main()
{
    string name;
    cout << "Enter your name please: ";
    cin >> name;
    cout << "Hello " << name << endl << "Wellcome to C++ world";
    system("pause");
    return 0;
}
```

Assignment

- **Draw a flow chart for an algorithm that takes two numbers and display the largest**

- **Write a C++ program that takes two numbers and performs the arithmetic operations (+, -, x, /) and displays the result of each operation**