```
...
...
i = 1;
do{
        printf("Enter a number from 1 - 20: ");
        scanf("%d", &num);
}while(num < 1 || num > 20);
...
...
do{
        printf("i = %d\n", i);
        i++;
}while(i <= num);
...
```

# C++

# Control Statement
# IF & SWICH

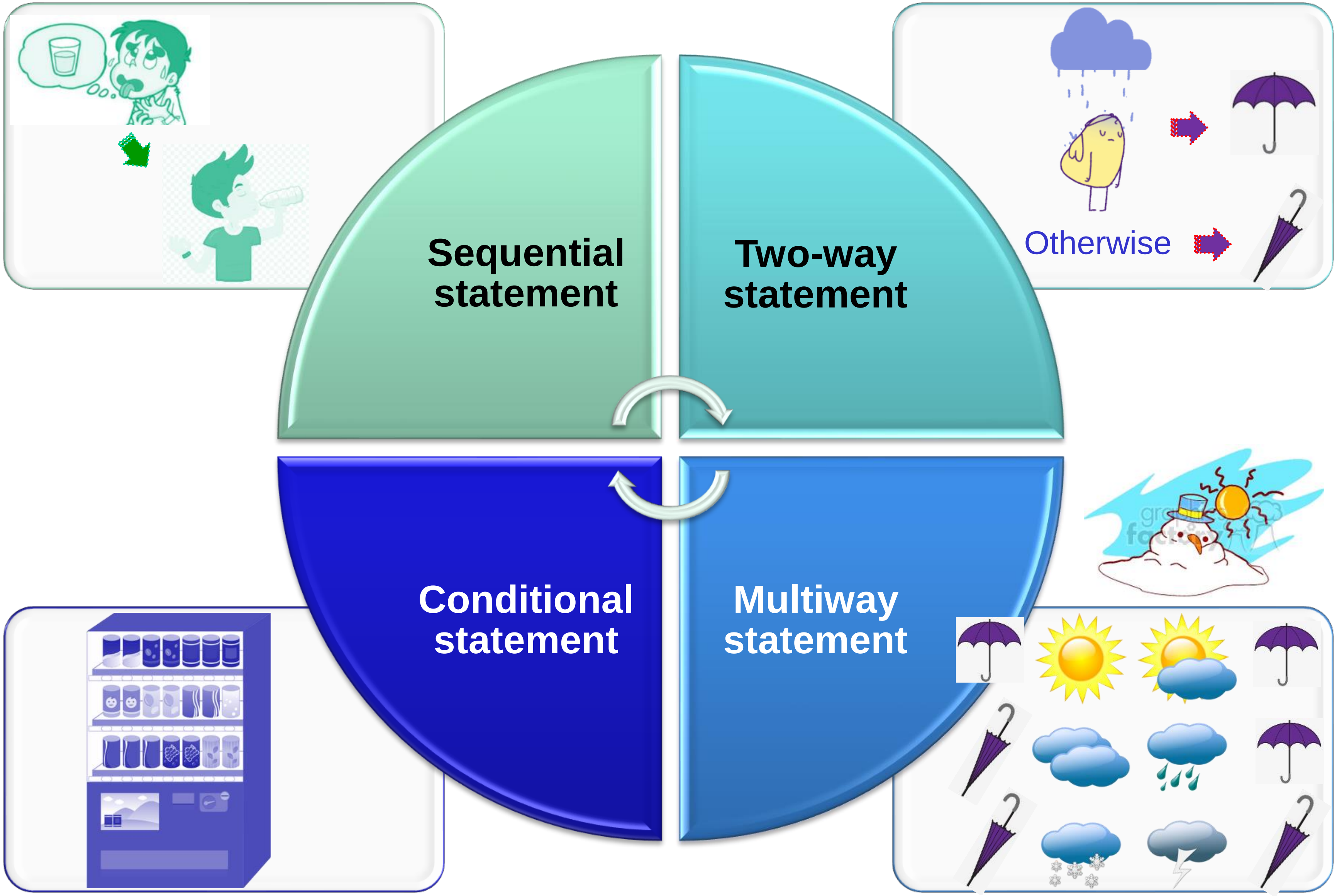
## 03 CONTROLS

# Controls

- What is a Control?
  - Statement used to enable some instructions to be executed repeatedly until some logical condition has been satisfied.
    - Branching:
      - if
      - switch
    - Looping:
      - for
      - while
      - do - while

```
if(x < y) {
   x++;
   cout << "Result = " << x;
} else {
   y++;
   cout << "Result = " << y;
}
...
x = 5;
y = 7;
while(x < y) {
   cout << "X = " << x;
   x++;
}
cout << "Bye!";
```

# Control -- Branching



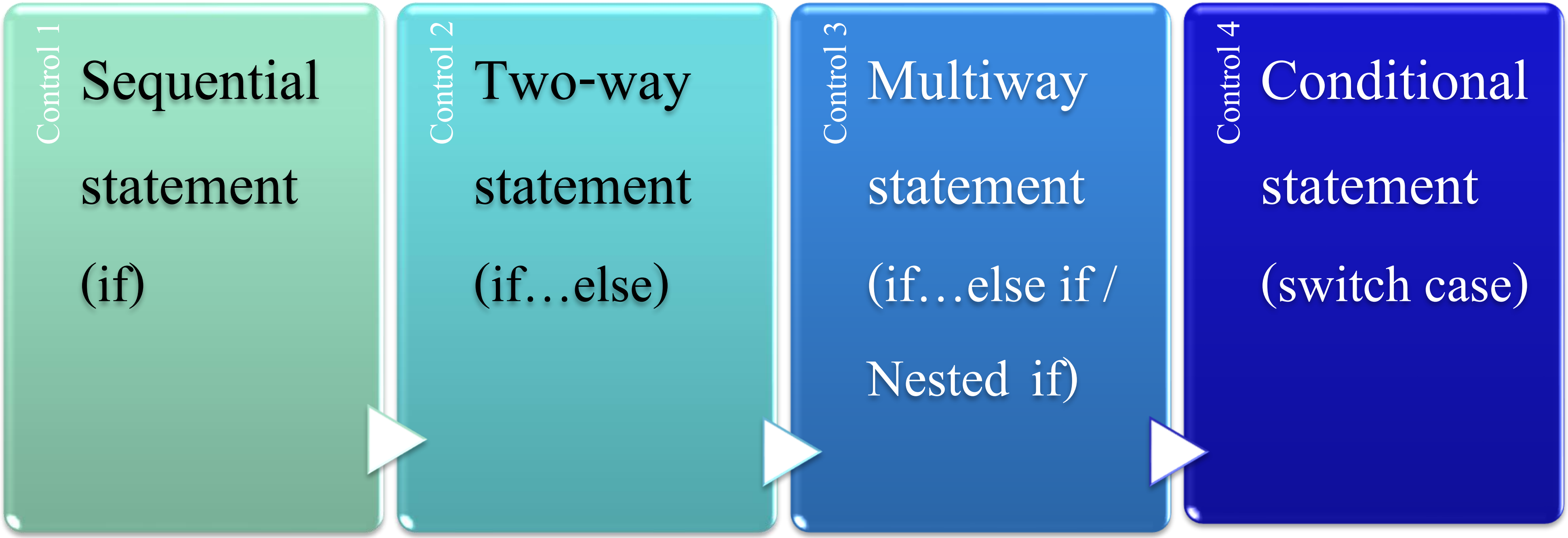
Sequential statement

Two-way statement

Conditional statement

Multiway statement

# Control -- Branching



Control 1

Sequential statement (if)

Control 2

Two-way statement (if…else)

Control 3

Multiway statement (if…else if / Nested if)

Control 4

Conditional statement (switch case)

```
...
...
i = 1;
do{
        printf("Enter a number from 1 - 20: ");
        scanf("%d", &num);
}while(num < 1 || num > 20);
...
...
do{
        printf("i = %d\n", i);
        i++;
}while(i <= num);
...
```

C++

# Sequential Statement
# IF

03 CONTROLS

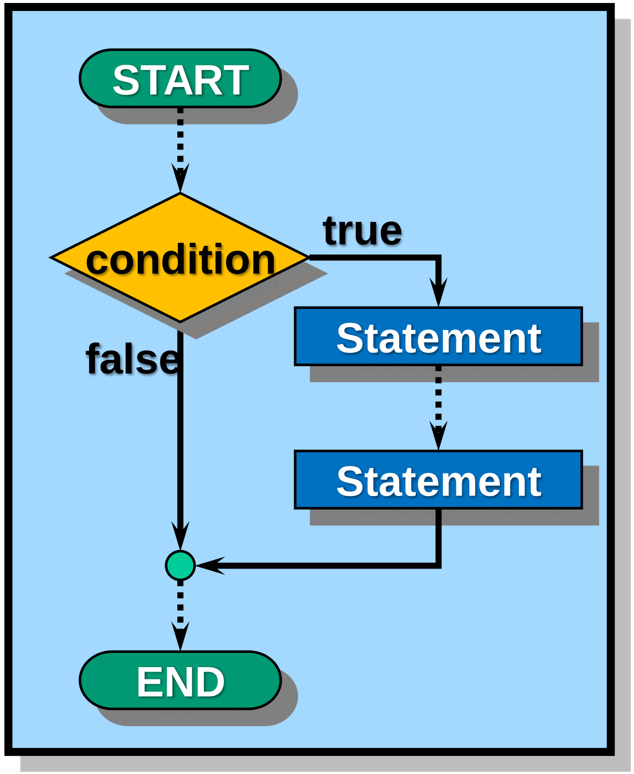
# Sequential Statement (if)

- Conditions can be true or false.
- Execute statements in a brace {}, when the condition is true.
- One statement may not require a brace {}.

```
if (condition)
  statement1;
```

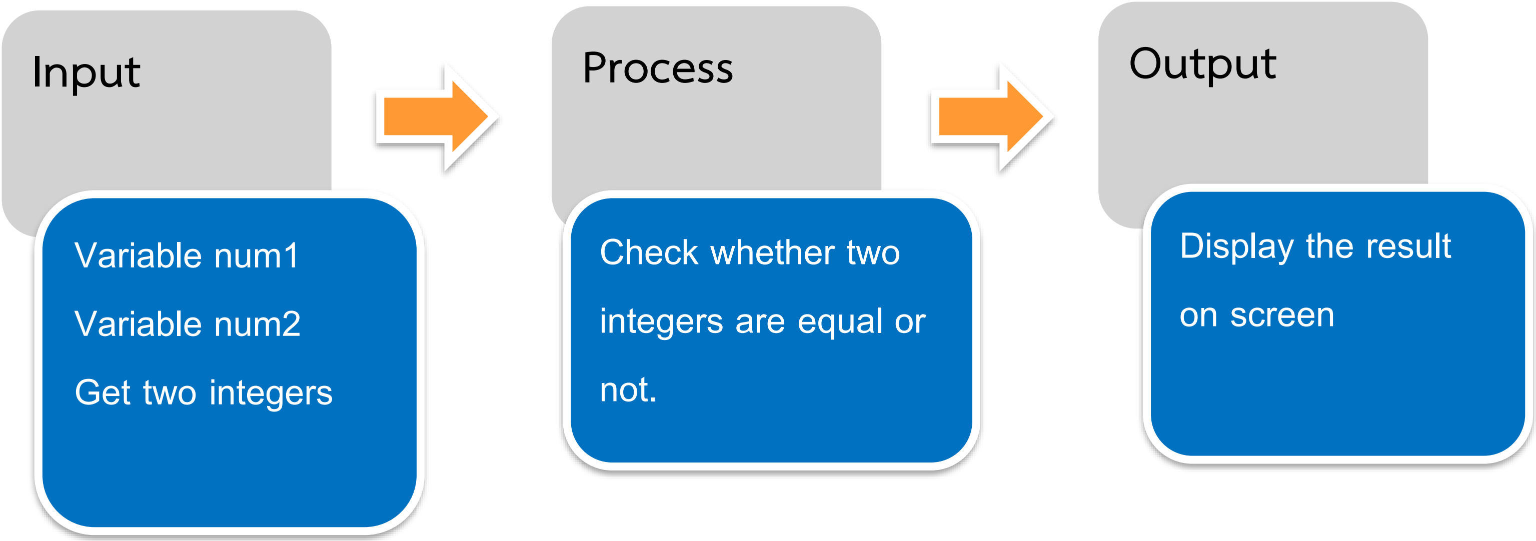
```
if (condition)
{
  statement1;
         :
  statementN;
}
```

Flowchart



# Problem 1: Sequential if statement

- Check whether two integers are equal or not.
- Write a C++ program to accept two integers and display the result on screen.
- 1. Analyze the problem



Input

Variable num1

Variable num2

Get two integers

Process

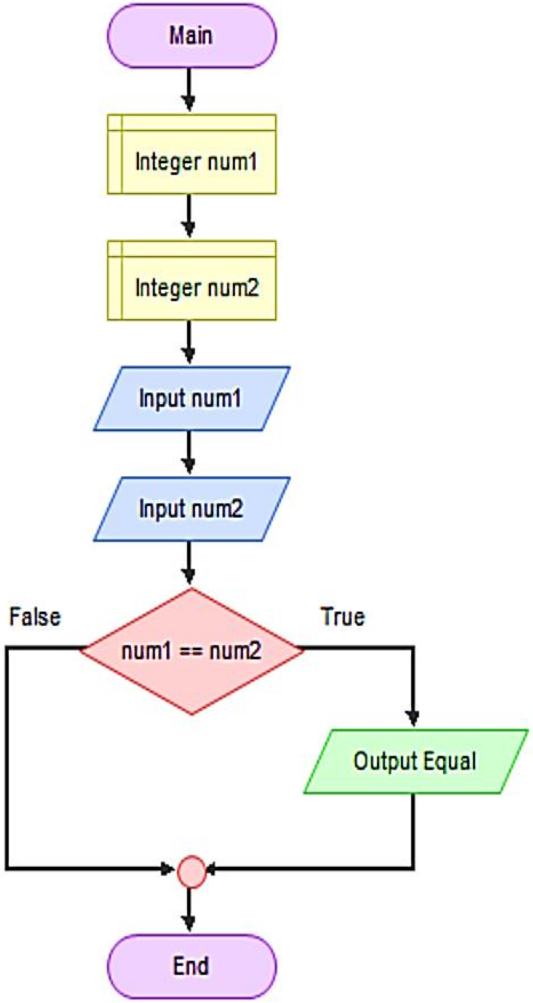
Check whether two integers are equal or not.

Output

Display the result on screen

# Problem 1: Sequential if statement (Cont.)

## Flowchart

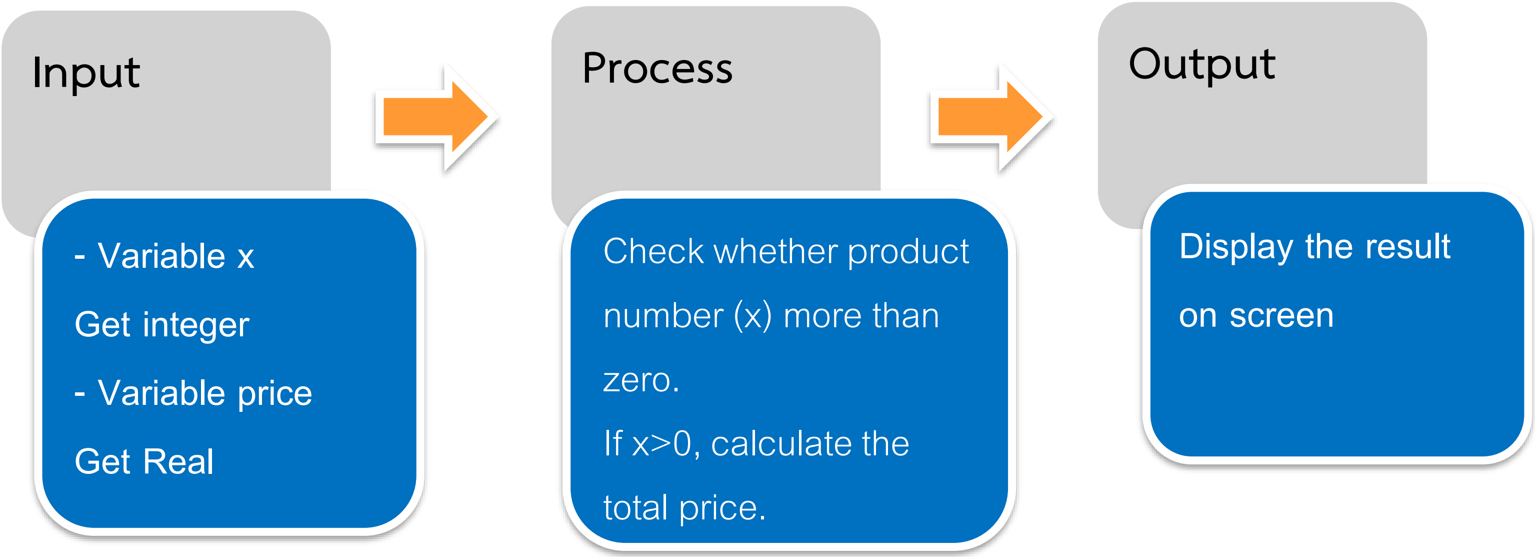


## Source Code

```
#include <iostream>
using namespace std;

int main() {
    int num1, num2;

    cin >> num1 >> num2;

    if (num1 == num2) {
        cout << "Equal" << endl;
    }
}
```

# Problem 2: Sequential if statement

- Check whether product number (x) more than zero.
- If the product number is more than zero, find the total price (sum) derived from selling price (price) per unit multiplied by the product number (x).
- Write a C++ program to accept one integer and one floating point and display the result on screen.
- 1. Analyze the problem



Input

- Variable x

Get integer

- Variable price

Get Real

Process

Check whether product number (x) more than zero.

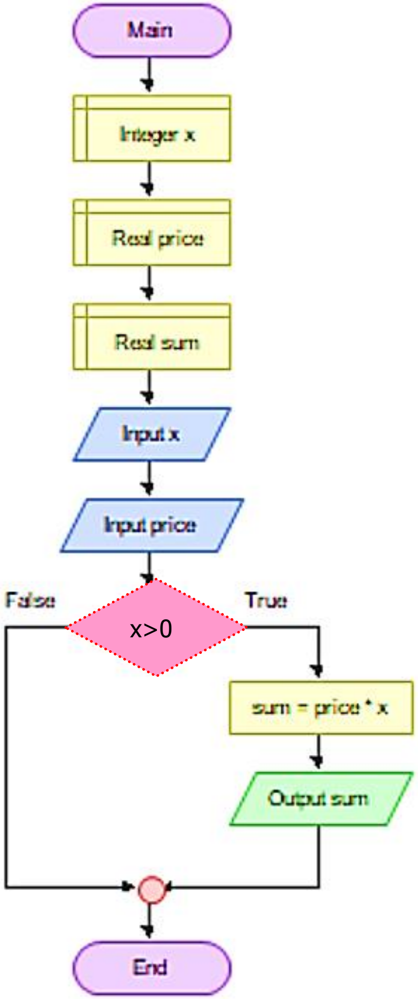
If x>0, calculate the total price.

Output

Display the result on screen

# Problem 2: Sequential if statement (Cont.)

## Flowchart



## Source Code

```
#include <iostream>
using namespace std;

int main() {
    int x;
    float sum, price;

    cin >> x >> price;

    if (x>0) {
        sum = price*x;
        cout << sum << endl;
    }
}
```

# Problem 3: Sequential if statement

- Branching: if

```
...
result = 85;
if(result >= 80)      cout << "A";
if(result >= 70)      cout << "B";
if(result >= 60)      cout << "C";
if(result >= 50)      cout << "D";
cout << "F";
```

**Answer?**

# Problem 4: Sequential if statement

- Branching: if

```
...
result = 65;
if(result >= 80)      cout << "A";
if(result >= 70)      cout << "B";
if(result >= 60)      cout << "C";
if(result >= 50)      cout << "D";
cout << "F";
```

**Answer?**

# Problem 5: Sequential if statement

5.1

```
x = 80;
if (( x > 0 ) && ( x < 10 ))
    cout << “You Passed.\n”);
```

Answer?

5.2

```
x = 5;
if (( x > 0 ) && ( x < 10 ))
    cout << “You Passed.\n”;
```

Answer?

5.3

```
x = 80, y = 5;
if (( x > 5 ) || ( y > 10 ))
    cout << “You Passed.\n”;
```

Answer?

5.4

```
x = 80, y = 5;
if (( x >=20 && x <30) || (y==5))
    cout << “You Passed.\n”;
```

Answer?

```
...
...
i = 1;
do{
        printf("Enter a number from 1 - 20: ");
        scanf("%d", &num);
}while(num < 1 || num > 20);
...
...
do{
        printf("i = %d\n", i);
        i++;
}while(i <= num);
...
```

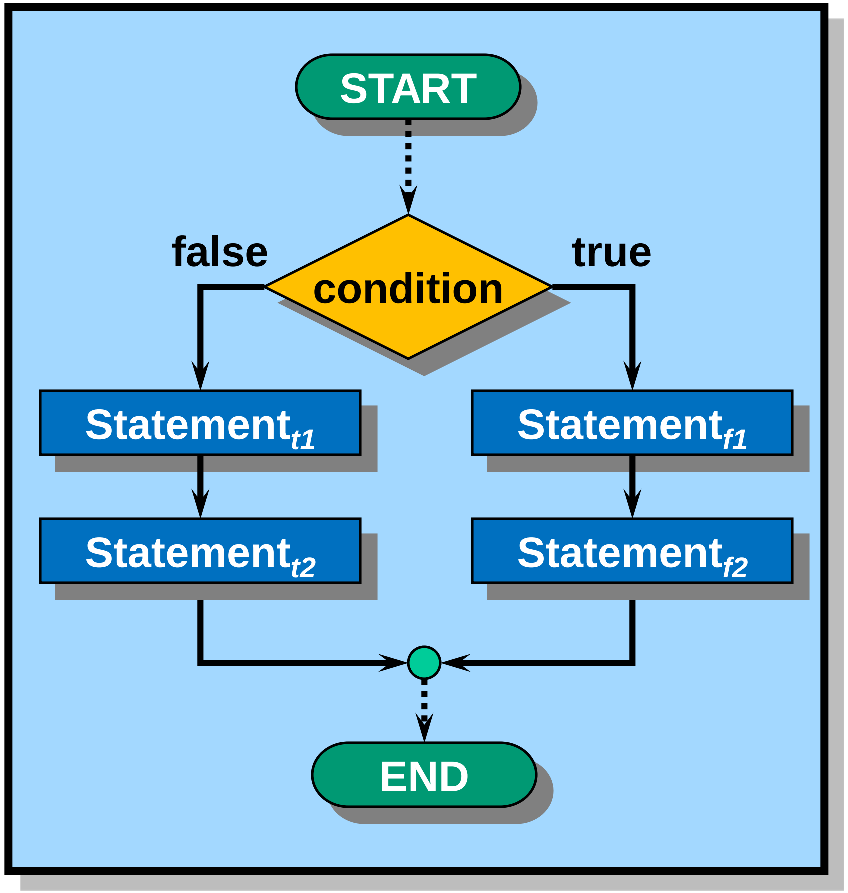
C++

# Two-way Statement
# IF...ELSE

03 CONTROLS

# Two-way Statement (if…else)

## Flowchart

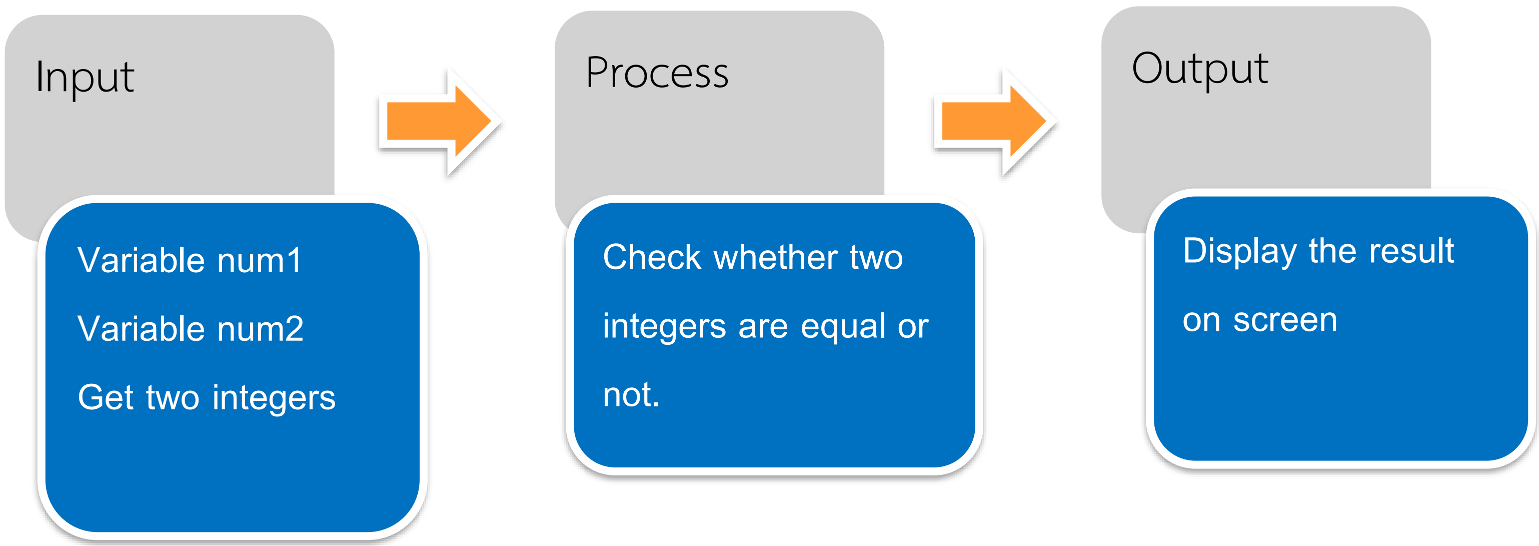


## Syntax

```
if (condition)
{
   statement_t1;
         :
   statement_t2;
}
else
{
   statement_f1;
         :
   statement_f2;
}
```

# Problem 1: Two-way Statement (if…else)

- Check whether two integers are equal or not.
- Write a C++ program to accept two integers and display the results (Equal or Not Equal) on screen.
- 1. Analyze the problem



Input

Variable num1

Variable num2

Get two integers

Process

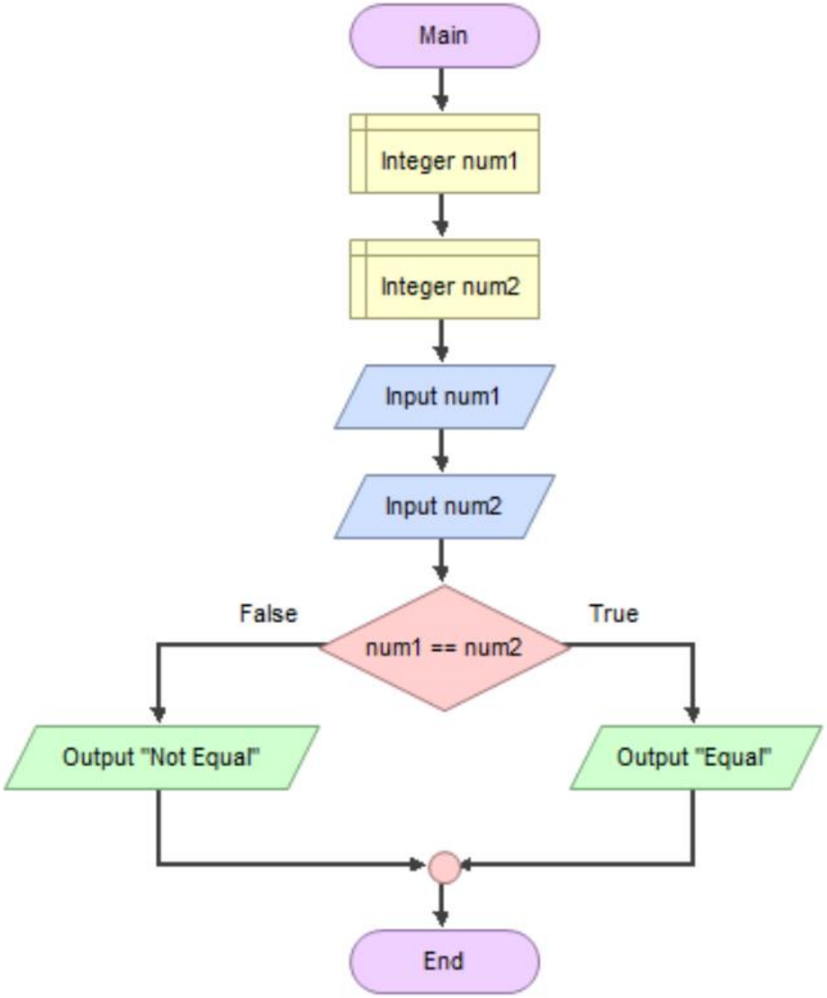
Check whether two integers are equal or not.

Output

Display the result on screen

# Problem 1: Two-way Statement (if…else) (Cont.)

## Flowchart

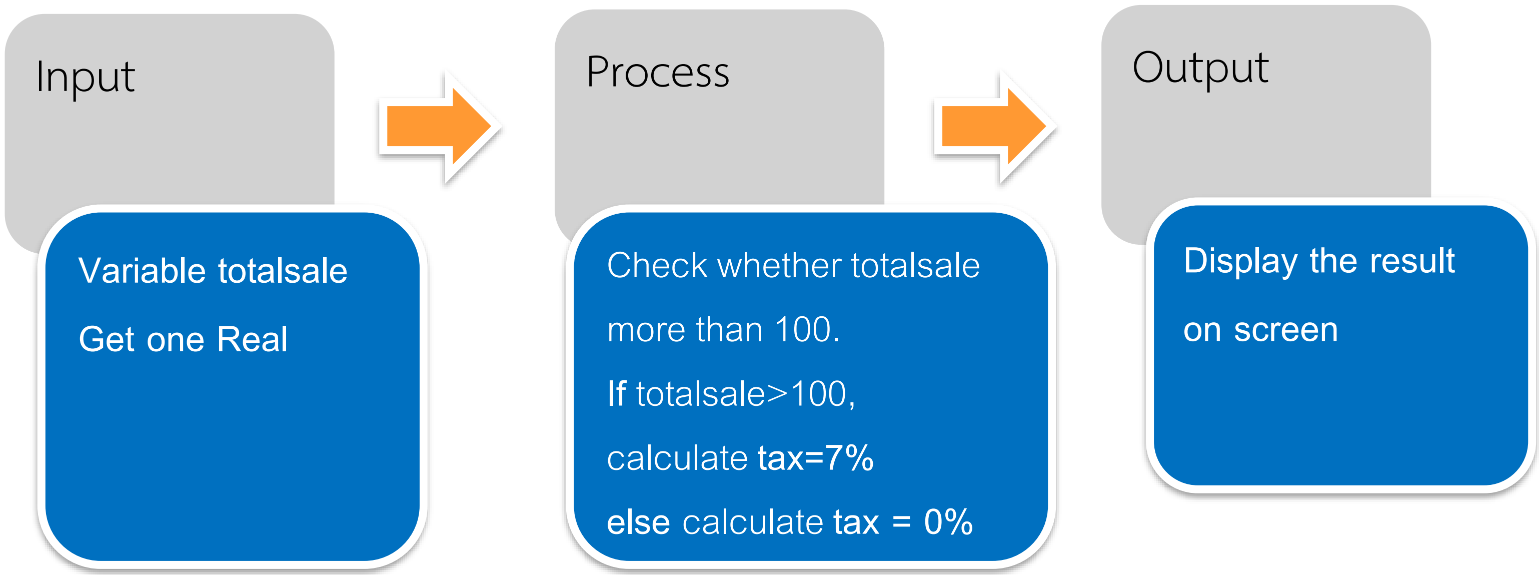


## Source Code

```
#include <iostream>
using namespace std;

int main() {
    int num1, num2;

    cin >> num1 >> num2;

    if (num1 == num2) {
        cout << "Equal" << endl;
    } else {
        cout << "Not Equal" << endl;
    }
}
```

# Problem 2: Two-way Statement (if…else)

- Check whether total sale more than 100.
- If the total sale is more than 100, tax is 7%.
- If the total sale is less than or equal 100, tax is 0%.
- Write a C++ program to accept one integer and display the result on screen.
- 1. Analyze the problem



Input

Variable totalsale

Get one Real

Process

Check whether totalsale more than 100.

If totalsale>100, calculate tax=7%

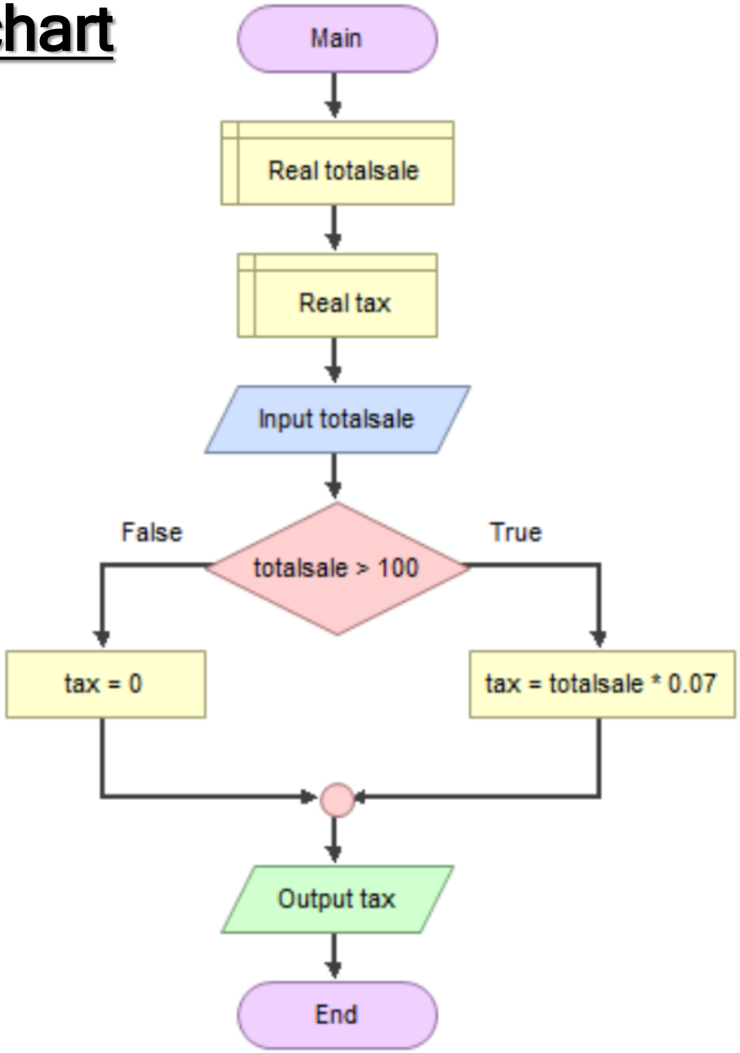
else calculate tax = 0%

Output

Display the result on screen

# Problem 2: Two-way Statement (if…else) (Cont.)

## Flowchart



## Source Code

```
#include <iostream>
using namespace std;

int main() {
    float totalsale, tax;

    cin >> totalsale;

    if (totalsale > 100)
        tax = 0.07 * totalsale;
   else
        tax = 0;

   cout << tax << endl;
}
```

# Problem 3: Two-way Statement (if…else)

- Branching: if … else

```
...
int a = 25, b = 20;

if ( b > a )
        cout << "B is greater";
else
        cout << "A is greater";
```

**Answer?**

# Problem 4: Two-way Statement (if…else)

❑ Branching: if … else

```
...
int num1 = 20;
int num2 = 40;

if (num1 >= 20 && num2 > 30)
      cout << "If Block";
else
      cout << "Else Block";
```

**Answer?**

C++

```
...
...
i = 1;
do{
        printf("Enter a number from 1 - 20: ");
        scanf("%d", &num);
}while(num < 1 || num > 20);
...
...
do{
        printf("i = %d\n", i);
        i++;
}while(i <= num);
...
```

# Multiway Statement IF...ELSE IF

03 CONTROLS

# Multiway Statement (if…else if)

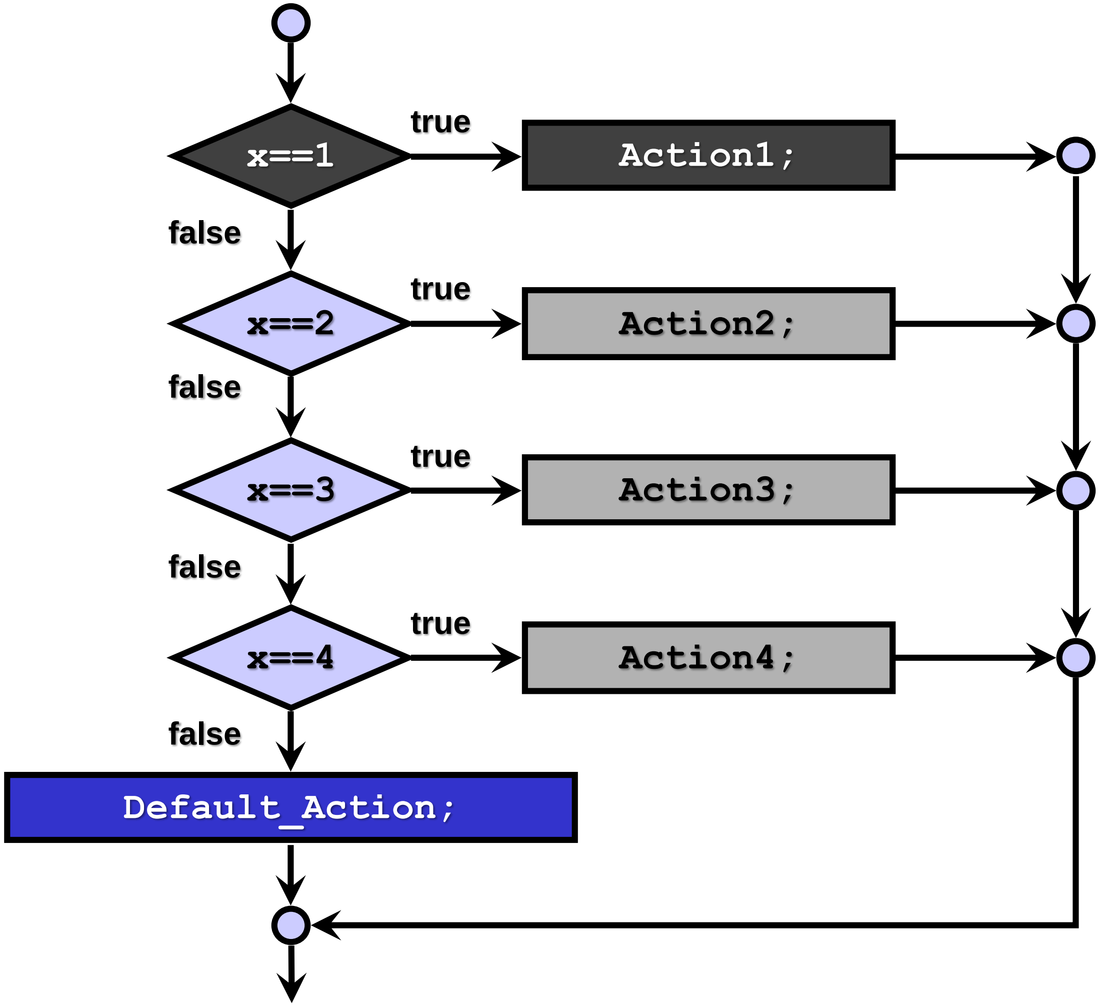
- Branching: if - else if

```
if(condition)
      statement;
else if(condition)
      statement;
else
      statement;
```

```
if(condition) {
      statement;
      statement;
} else if(condition) {
      statement;
      statement;
} else if(condition) {
      statement;
      statement;
} else {
      statement;
      statement;
}
```

# Multiway Statement (if…else if)

```
if (x==1)
      Action1;
else if (x==2)
        Action2;
else if (x==3)
        Action3;
else if (x==4)
        Action4;
else
     Default_Action;
```

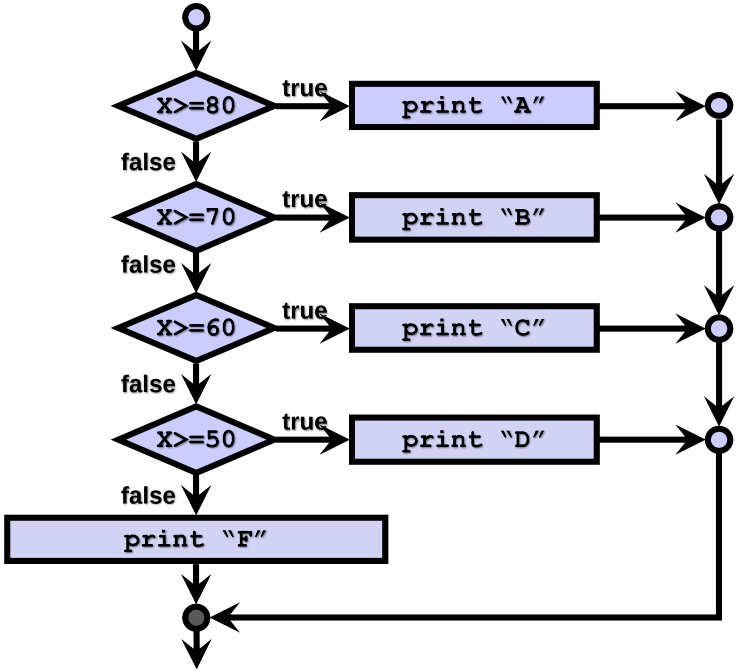


# Problem 1: Multiway Statement (if…else if)

- Branching: if - else if

```
...
int result = 85;
if(result >= 80)     cout << "A";
else if(result >= 70)   cout << "B";
else if(result >= 60)   cout << "C";
else if(result >= 50)   cout << "D";
else cout << "F";
```

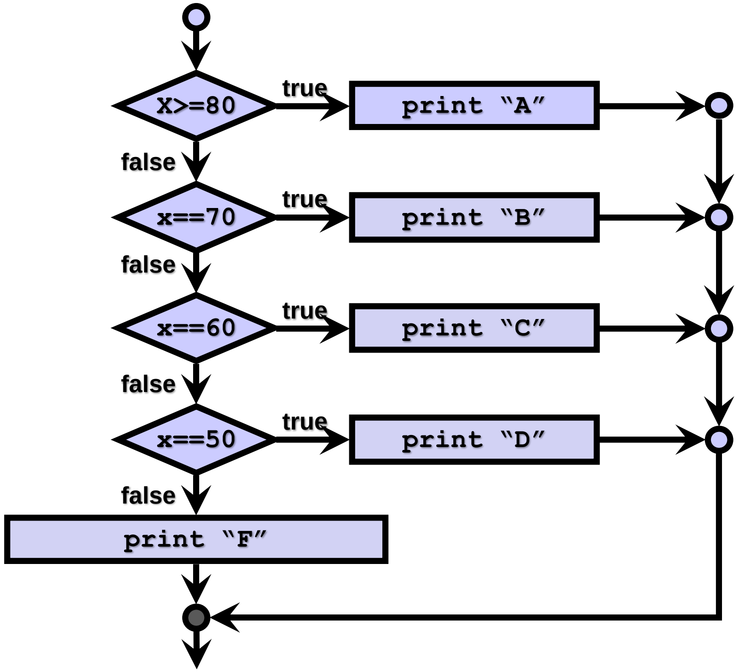
**Answer?**



# Problem 2: Multiway Statement (if…else if)

- Branching: if - else if

```
...
int result = 65;
if(result >= 80)   cout << "A";
else if(result >= 70)   cout << "B";
else if(result >= 60)   cout << "C";
else if(result >= 50)   cout << "D";
else cout << "F";
```



**Answer?**

# Problem 3: Multiway Statement (if…else if)

Write a C++ program to analyze student’s grade be getting student scores and display the result on screen.

Conditions of grade are as follows:

- □ 80-100 => Grade A
- □ 70-79.9 => Grade B
- □ 60-69.9 => Grade C
- □ 50-59.9 => Grade D
- □ 0-50 => Grade F
- □ Other => Invalid point!!

**Source Code**

**???**

C++

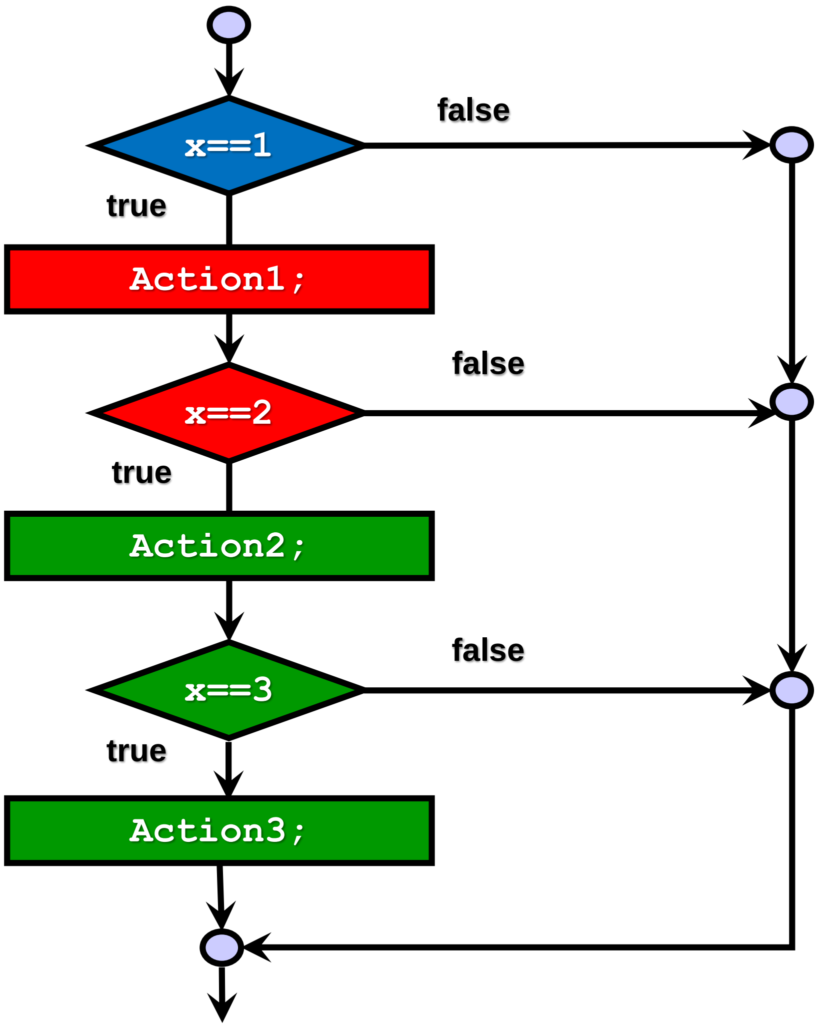
```
...
...
i = 1;
do{
        printf("Enter a number from 1 - 20: ");
        scanf("%d", &num);
}while(num < 1 || num > 20);
...
...
do{
        printf("i = %d\n", i);
        i++;
}while(i <= num);
...
```

# Multiway Statement
# NESTED IF

03 CONTROLS

# Multiway Statement (Nested if)

```
if  (x==1)
{
  [Action1;]

  if  (x==2)
  {
       [Action2;]

       if  (x==3)
            [Action3;]
  }
}
```



# Problem 1: Nested if

```
if ( num >= 20 )
{
        if ( num <= 30 )
        {
              if ( num % 2 == 1 )
                          cout << “Right number\n”;
              else
                          cout << “Wrong number\n”;
        } else
                    cout << “Large number\n”;
} else {
          cout << “Small number\n”;
}
```

<u>ผลการรัน</u>

```
Enter a number : 20
```

# Problem 1: Nested if (Cont.)

```
if ( num >= 20 )
{
        if ( num <= 30 )
        {
              if ( num % 2 == 1 )
                         cout << “Right number\n”;
              else
                         cout << “Wrong number\n”;
        } else
                   cout << “Large number\n”;
} else {
          cout << “Small number\n”;
}
```

ผลการรัน

```
Enter a number : 20

Wrong number


Enter a number : 35
```

# Problem 2: Nested if

- Write a C++ program to find whether a given year is a leap year or not.
- Three criteria must be taken into account to identify leap years:
  - The year can be evenly divided by 4;
  - If the year can be evenly divided by 100, it is NOT a leap year, unless;
  - The year is also evenly divisible by 400. Then it is a leap year.

Input 1

2012

Output 1

Yes

Input 2

1900

Output 2

No

Input 3

2000

Output 3

Yes

# Problem 2: Nested if (Cont. 1)

```
#include <iostream>

using namespace std;

int main() {

  int year;

  cin >> year;
```

- The year can be evenly divided by 4;
- If the year can be evenly divided by 100, it is NOT a leap year, unless;
- The year is also evenly divisible by 400. Then it is a leap year.

```
if (year%4 == 0) {

        May be a Leap Year !!

 } else {
   cout << "No" << endl;
 }
}
```

# Problem 2: Nested if (Cont. 2)

- The year can be evenly divided by 4;
- If the year can be evenly divided by 100, it is NOT a leap year, unless;
- The year is also evenly divisible by 400. Then it is a leap year.

```
#include <iostream>

using namespace std;

int main() {

        int year;

        cin >> year;

        if ( ((year%4==0) && (year%100!=0)) || (year%400==0) ) {
            cout << "Yes" << endl;
        } else {
            cout << "No" << endl;
        }
}
```

# Problem 3: Nested if

Write a C++ program to return the change to a customer by getting product price and display the result on screen. The amount paid by the customer is fixed at 1000 baht.

Conditions of the change are as follows:

□ First, the seller gives change the biggest banknotes or the biggest coins to a customer.

□ The seller has only the banknotes 100 bath and the coins 1 baht.

□ The seller has the banknotes and the coins unlimitedly.

**Input:** Get one integer of product price

**Output:** 1-2 lines as follows.

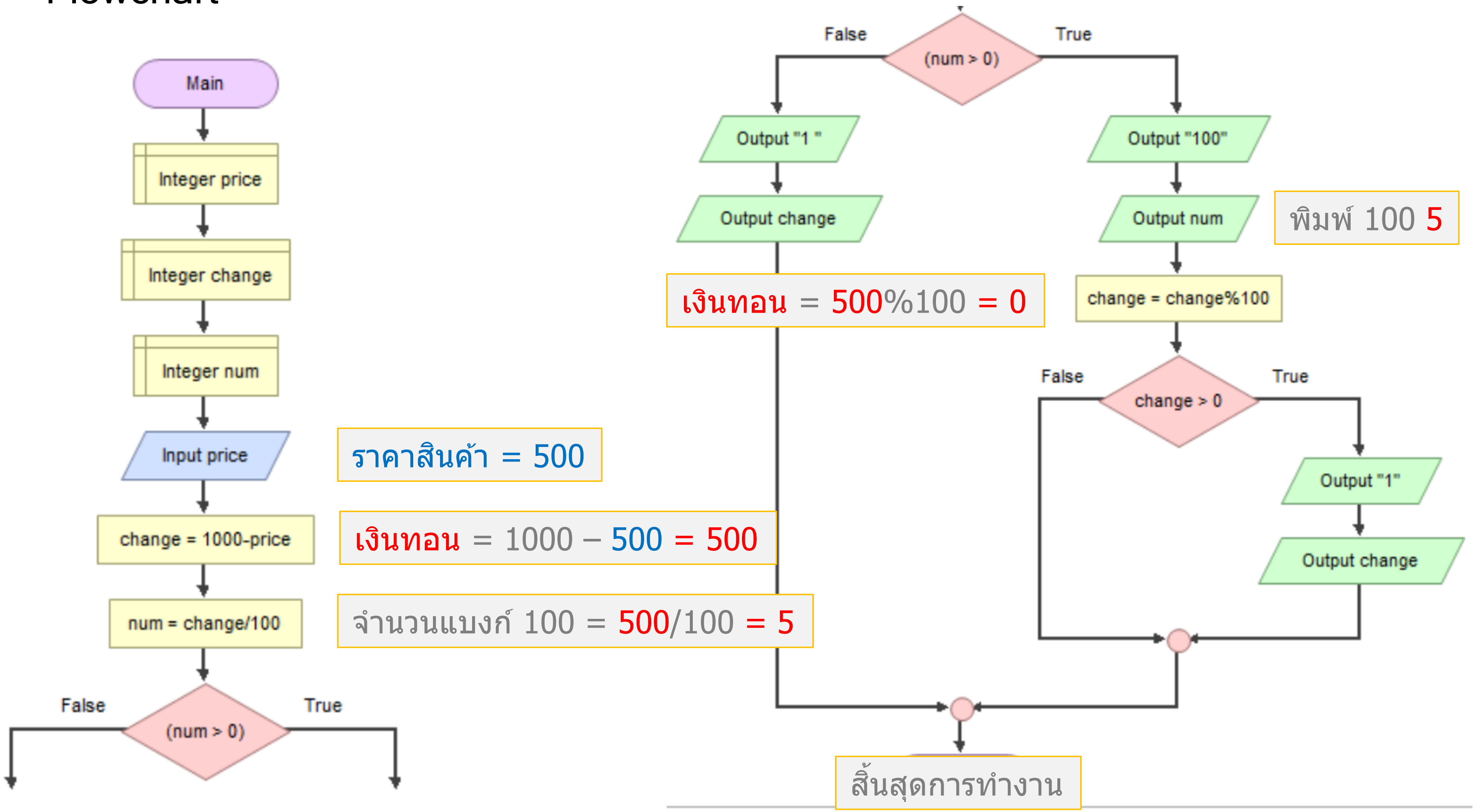
1) 100 and the number of banknotes 100 baht changed (If any).

2) 1 and the number of banknotes 1 baht changed (If any).

| **Input** | **Output** |
|---|---|
| 500 | 100 5<br>Change = 1000 – 500 = 500 |
| 650 | 100 3<br>1 50<br>Change = 1000 – 650 = 350 |

# Problem 3:  Nested if (Cont. 1)

- Flowchart



ราคาสินค้า = 500

เงินทอน = 1000 – 500 = 500

จำนวนแบงก์ 100 = 500/100 = 5

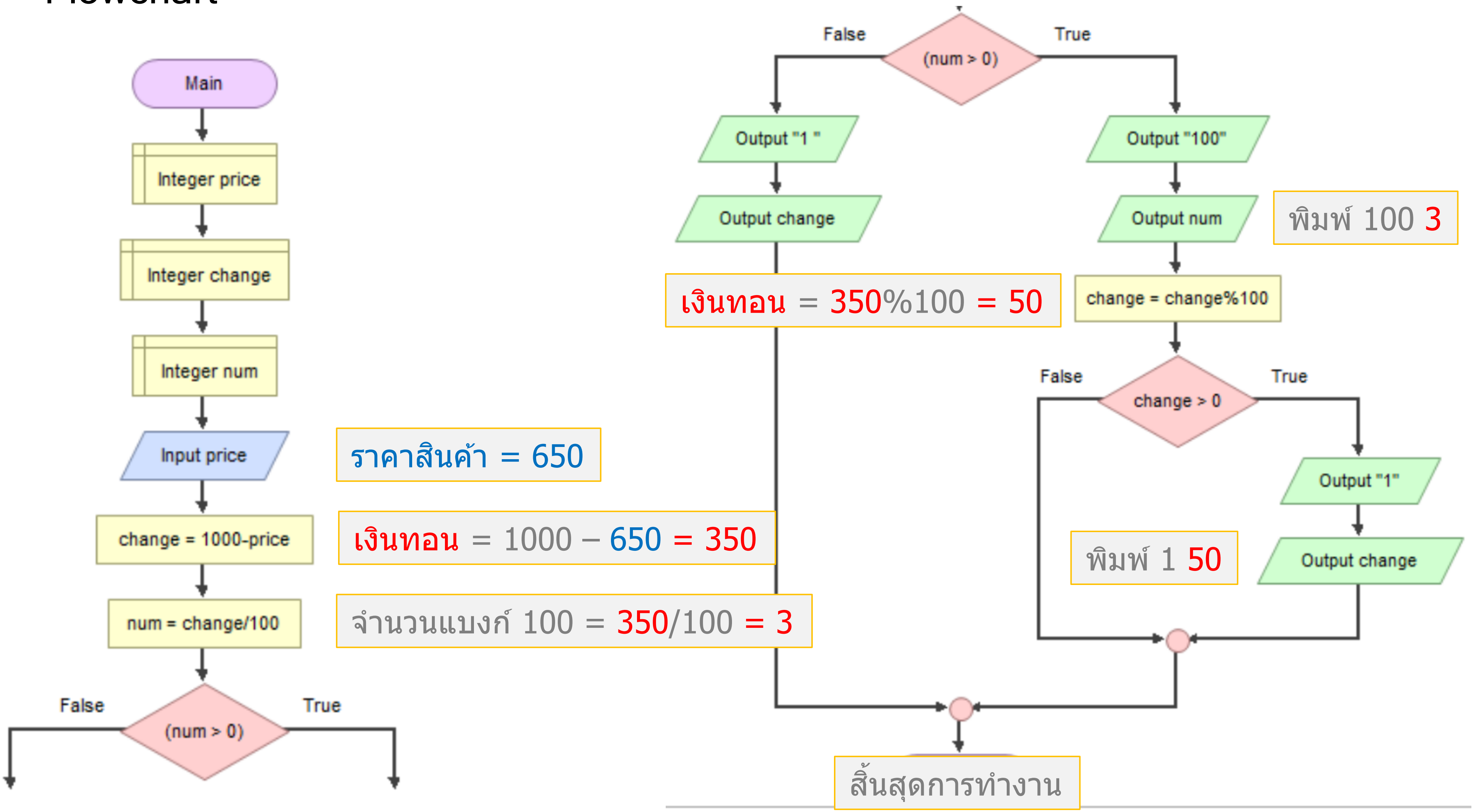
เงินทอน = 500%100 = 0

พิมพ์ 100 5

สิ้นสุดการทำงาน

# Problem 3: Nested if (Cont. 2)

- Flowchart



Main

Integer price

Integer change

Integer num

Input price

ราคาสินค้า = 650

change = 1000-price

เงินทอน = 1000 – 650 = 350

num = change/100

จำนวนแบงก์ 100 = 350/100 = 3

(num > 0)

False

True

(num > 0)

False

True

Output "1 "

Output change

เงินทอน = 350%100 = 50

Output "100"

Output num

พิมพ์ 100 3

change = change%100

change > 0

False

True

Output "1"

Output change

พิมพ์ 1 50

สิ้นสุดการทำงาน

# Problem 4: Nested if …Tomorrow

- Write a C program to find day-month-year of tomorrow.

Input: Get three integer of day, month and year (A.D.), respectively.

Output: Day, month and year of tomorrow.

Input 1

```
1
1
2010
```

Output 1 (Number of the day)

```
2
1
2010
```

Input 2

```
28
2
2012
```

Output 2

```
29
2
2012
```

Input 3

```
31
12
2010
```

Output 3

```
1
1
2011
```

# Solution 4:  Nested if …Tomorrow

Answer?

# Problem 5: Nested if …Date

- Write a C program to find the difference between two specified date.
- Get five integer as follows:
  - 1st line: Year (A.D.)
  - 2nd and 3rd lines: The first day and the first month (month=1 means January)
  - 4th and 5th lines: The second day and the second month (the second month >= the first month)

Input 1

```
2010
1
10
1
12
```

Input 1 (Period)

```
61
```

Input 2

```
1999
5
1
5
3
```

Input 2

```
59
```

Input 3

```
1978
30
1
14
5
```

Input 3

```
104
```

# Solution 5: Nested if …Date

**Answer?**

```
...
...
i = 1;
do{
        printf("Enter a number from 1 - 20: ");
        scanf("%d", &num);
}while(num < 1 || num > 20);
...
...
do{
        printf("i = %d\n", i);
        i++;
}while(i <= num);
...
```

C++

# Conditional Statement
# SWITCH CASE

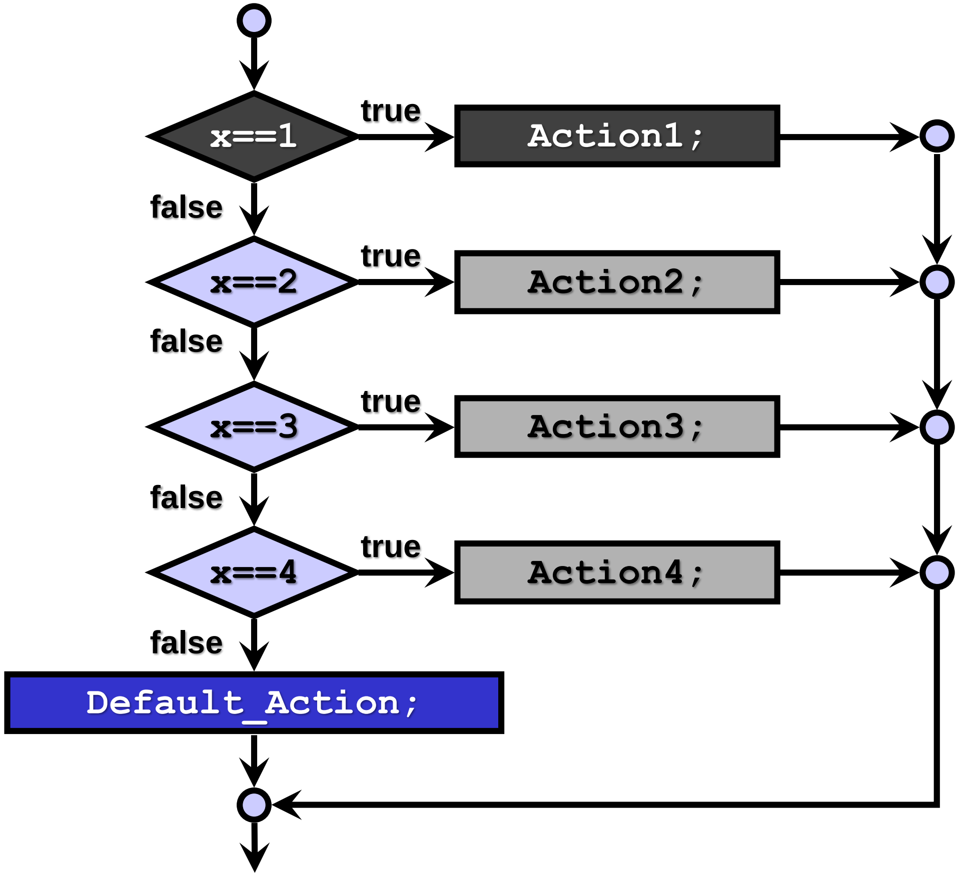
03 CONTROLS

# Conditional Statement (Switch Case)

- Branching: switch (ตัวเลือก)
    - General form of *switch* statement:

```
switch (x)
{
 case 1: Action1;
         break;
 case 2: Action2;
         break;
 case 3: Action3;
         break;
 case 4: Action4;
         break;
 default: Default_Action;
         break;
};
```

**Note:** ต่างกับ IF คือ ทำได้เฉพาะเปรียบเทียบด้วยเครื่องหมายเท่ากับ

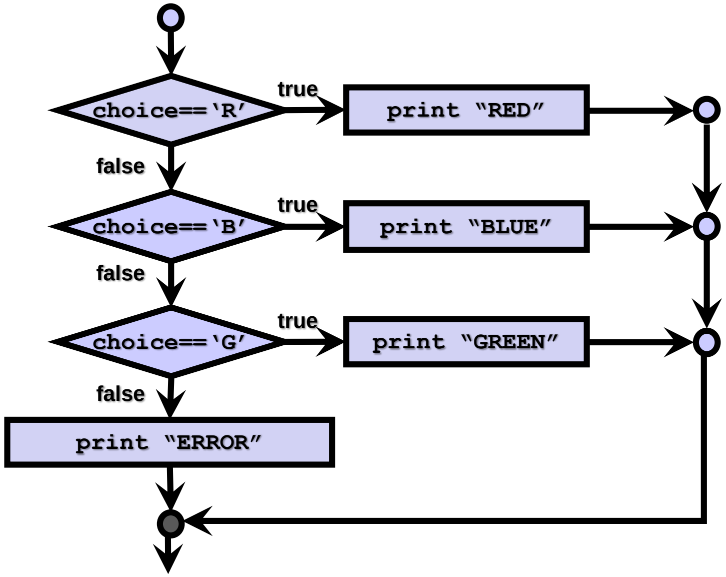


# Example: Switch Case Program

- Branching: switch (cont.)

```
...
int i;
cout << "Enter a number between 1 and 4:  ";
cin >> i;
switch(i) {
       case 1: cout << "One"; break;
       case 2: cout << "Two"; break;
       case 3: cout << "Three"; break;
       case 4: cout << "Four"; break;
       default: cout << "Unrecognized number"; break;
} /* end of switch */
```

# Switch VS. If…else if

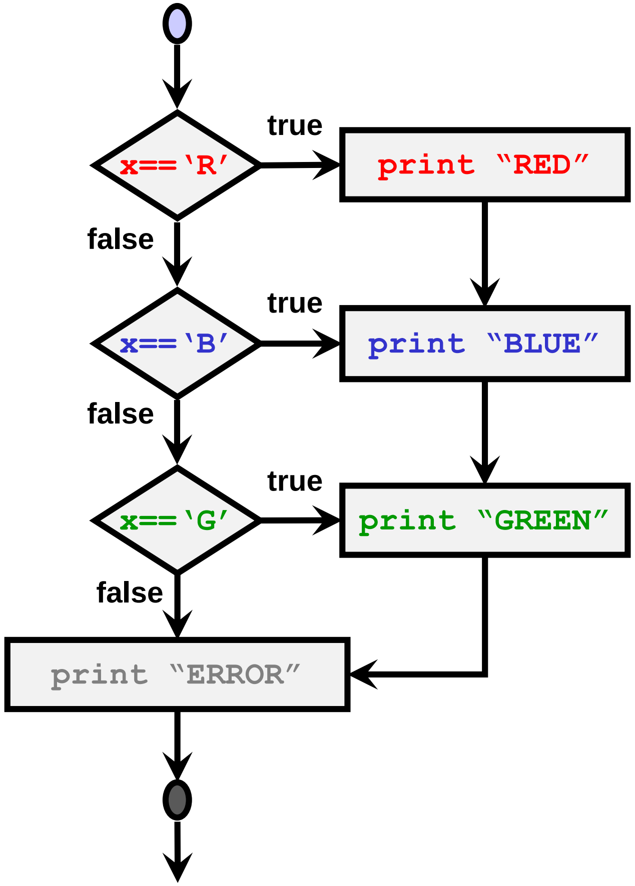


```
if(choice=='R')
   cout << "RED";
else if(choice=='B')
   cout << "BLUE";
else if(choice=='G')
   cout << "GREEN";
else
   cout << "ERROR";
```

```
...
char choice;
cout << "Enter a character: ";
cin >> choice;

switch(choice) {
         case 'R':
            cout << "RED";
            break;
         case 'B':
            cout << "BLUE";
            break;
         case 'G':
            cout << "GREEN";
            break;
         default:
            cout << "ERROR";
            break;
}
...
```

# Switch – Break Statement

❑ Break Statement is used to terminate loops

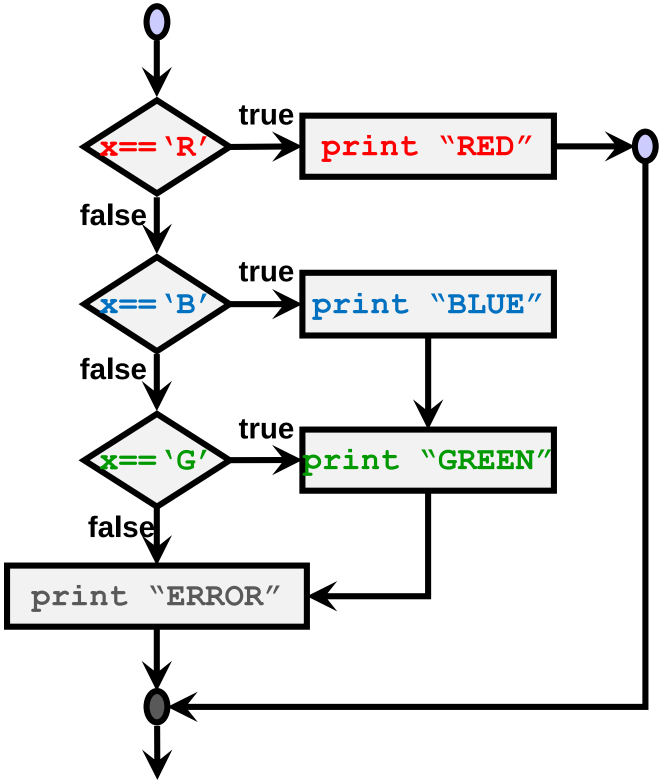


```
...
char x;
cout << "Enter a character: ";
cin >> x;

switch(x) {
        case 'R':
            cout << "RED";
            //break;
        case 'B':
            cout << "BLUE";
            //break;
        case 'G':
            cout << "GREEN";
            //break;
        default:
            cout << "ERROR";
            //break;
}
...
```

# Problem 1: Switch Case Program

- Break Statement is used to terminate loops

```
...
char choice;
cin >> choice;
switch (choice) {
  case 'R':
      cout << "RED";
      break;
  case 'B':
      cout << "BLUE";
      // break;
  case 'G':
      cout << "Green";
      // break;
  default:
      cout << "ERROR";
      break;
}
...
```

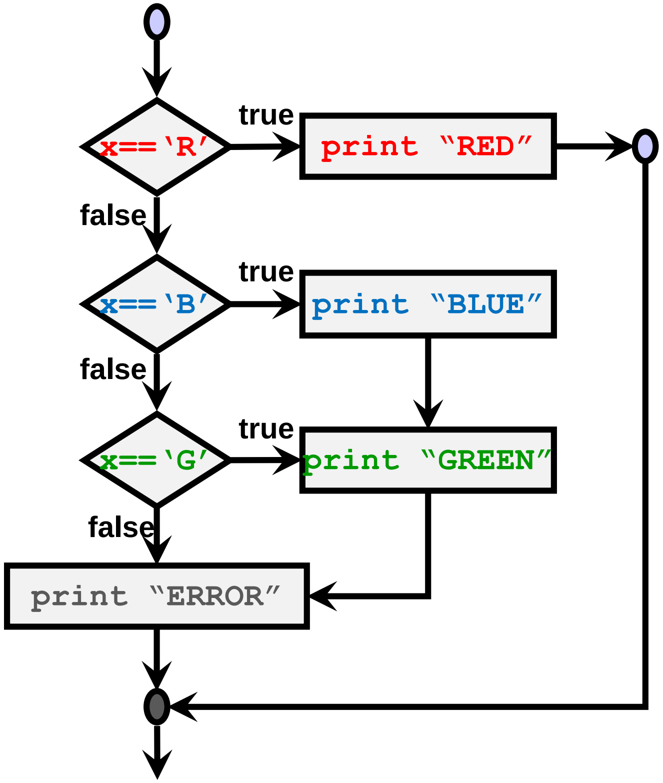


# Problem 1: Switch Case Program

B

- Break Statement is used to terminate loops

```
...
char choice;
cin >> choice;
switch (choice) {
  case 'R':
    cout << "RED";
    break;
  case 'B':
    cout << "BLUE";
    // break;
  case 'G':
    cout << "Green";
    // break;
  default:
    cout << "ERROR";
    break;
}
...
```



# Problem 1: Switch Case Program

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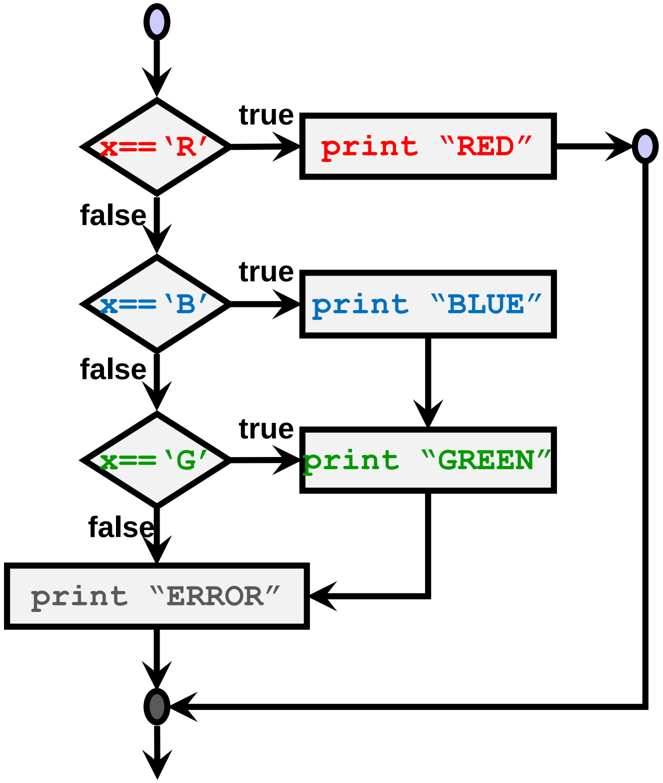


# Problem 2: Switch Case Program

Write a C++ program to calculate **the total price of Drink menu** using Switch Case.

Conditions of the price are as follows:

□ Choose 1, set the price at 50 per glass

□ Choose 2, set the price at 40 per glass

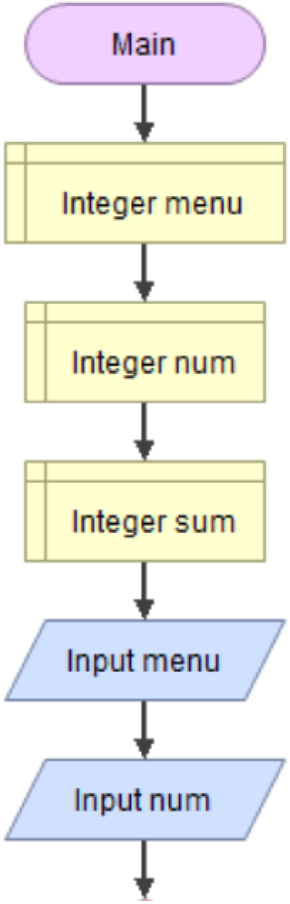
□ Choose 3, set the price at 35 per glass

□ Other, display ERROR and finish the program

Drink Menu: 2

Number: 5

Total Price: 200



Main

Integer menu

Integer num

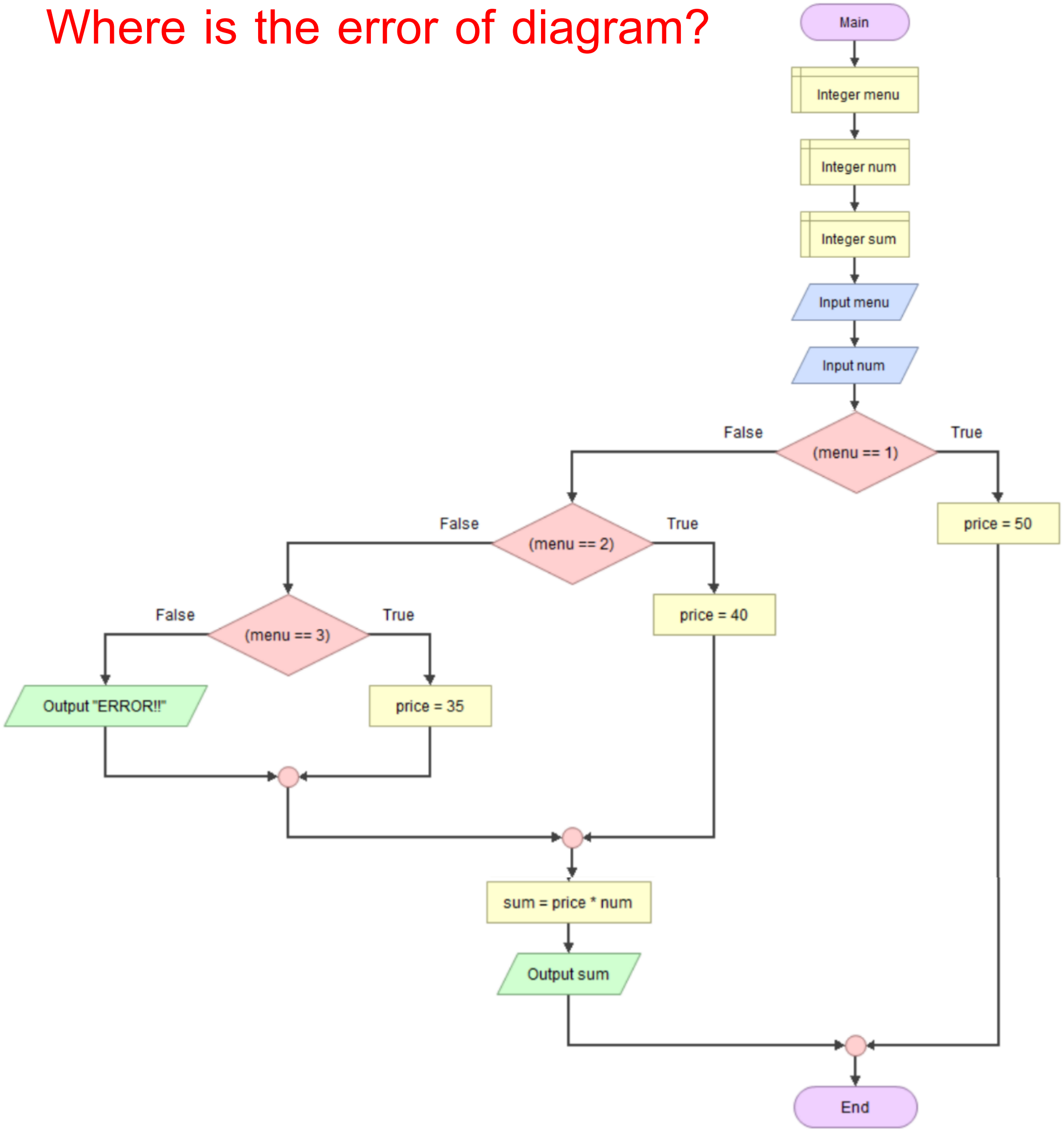
Integer sum

Input menu

Input num

# Problem 2: Switch Case Program  (Cont.)

Where is the error of diagram?



Source Code

???

# Problem 3: Switch Case Program

Write a C++ program to calculate the total price of Drink menu using Switch Case.

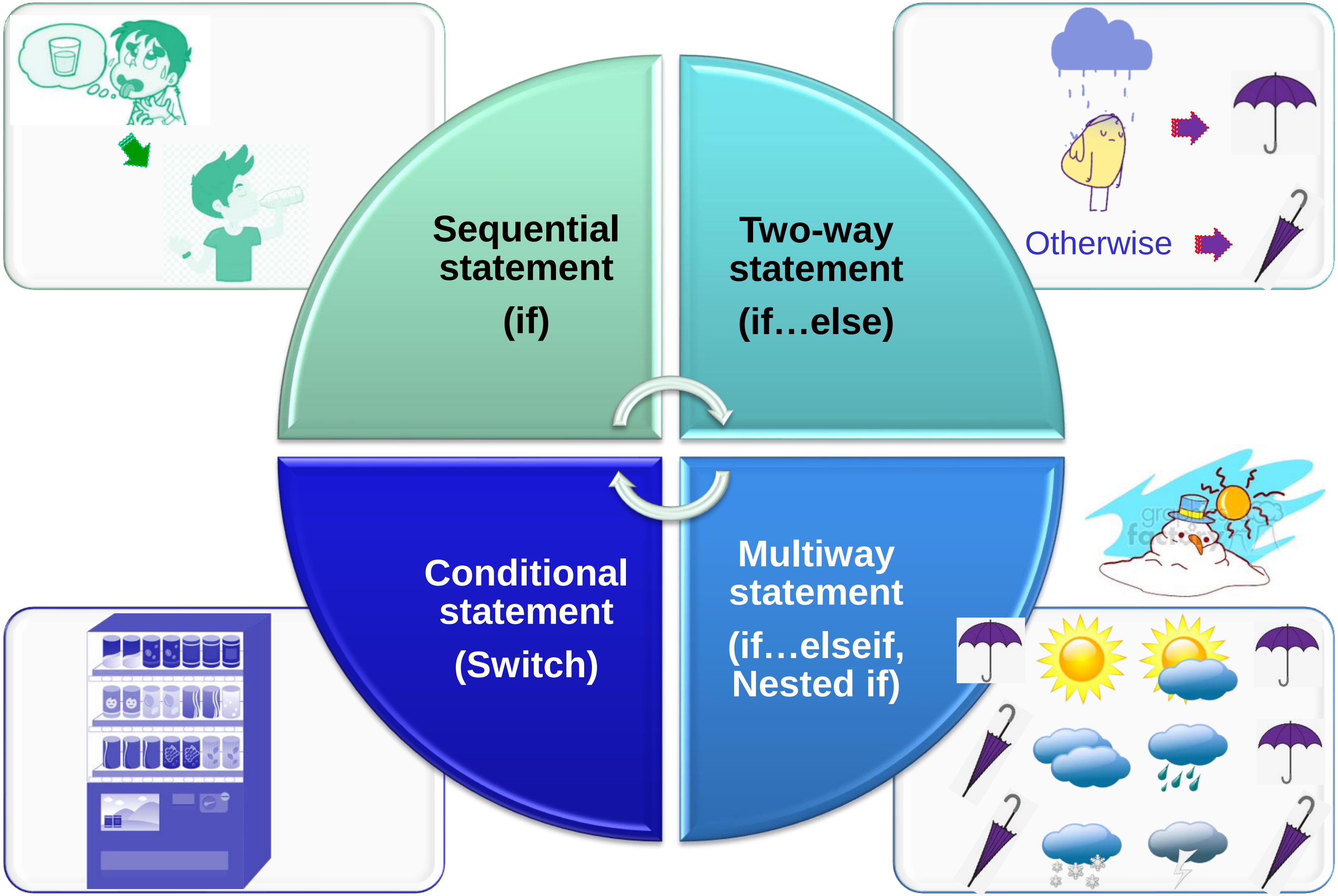
- ❑ Choose Mocha, Latte or Cappuccino, set the price at 50 per glass
- ❑ Choose Lemon Tea or Earl grey, set the price at 40 per glass
- ❑ Choose Chocolate, set the price at 35 per glass
- ❑ Other, display ERROR and finish the program

```
Drink Menu: Mocha

Number: 4

Total Price: 200
```

**Source Code**

**???**

# Conclusion: Control -- Branching



Sequential statement
(if)

Two-way statement
(if…else)

Conditional statement
(Switch)

Multiway statement
(if…elseif, Nested if)