1

Chapter 4: Selection-making decisions
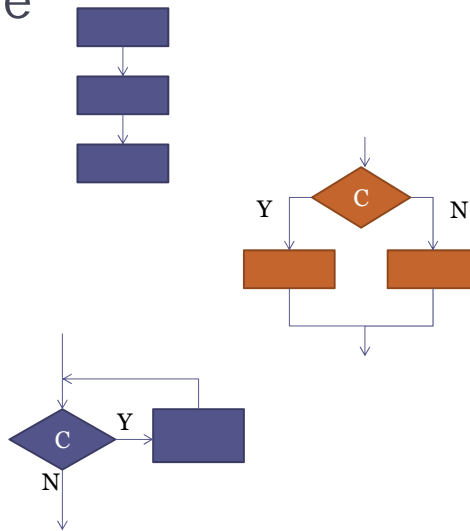
Course: 06016315 – Computer Programming

Asst. Prof. Dr. Kitsuchart Pasupa
Faculty of Information Technology
King Mongkut's Institute of Technology Ladkrabang

Outline

- Control Structure
- Selection Structure
  - ▫ Single Selection
  - ▫ Two-way Selection
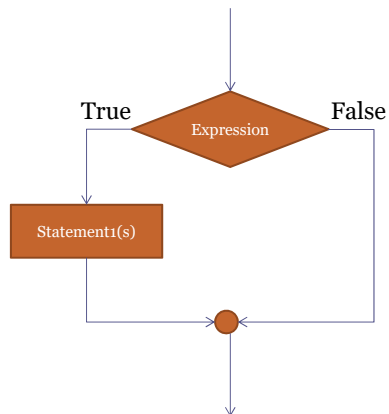 - ▫ Multiway Selection

Control Structure

- Sequence structure

- Selection structure

- Loop structure

Selection Structure

- Single selection
- Two-way selection
- Multi-way selection

Single Selection

True Expression False

Statement1(s)

```
if (expression)
    statement1;
```

```
if (expression)
{
    statement1.1;
    statement1.2;
    ...
    statement1.n;
}
```

Example

```c
#include <stdio.h>
int main()
{
    int numA = 10;
    int numB = 5;
    int numC = 0;

    if (numA > numB)
        numC = numA + numB;
    printf("%d", numC);
    return 0;
}
```
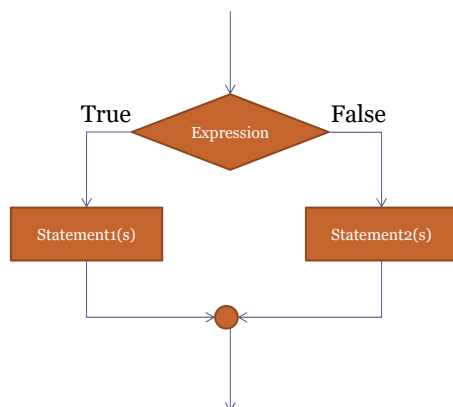
15

Example

```c
#include <stdio.h>
int main()
{
    float price;
    float discnt;
    printf("Enter price: ");
    scanf("%f", &price);
    if (price > 10000)
    {
        discnt = price * 0.8;
        printf("%.2f", discnt);
    }
    return 0;
}
```

```
Enter price: 12000
9600.00
```

Two-way Selection

True   Expression   False

Statement1(s)   Statement2(s)

```c
if (expression)
    statement1;
else
    statement2;
```

```c
if (expression)
{
    statement1.1;
    statement1.2;
    ...
    statement1.n;
}
else
{
    statement2.1;
    statement2.2;
    ...
    statement2.m;
}
```
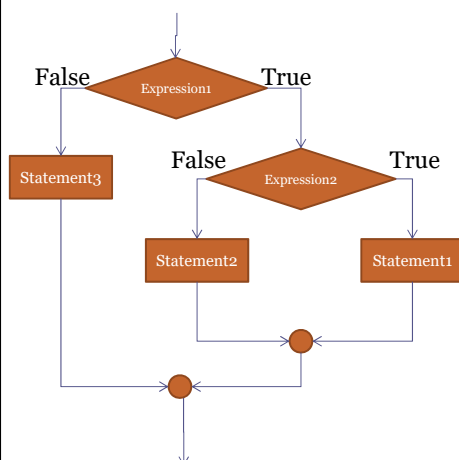
Example

```
#include <stdio.h>
int main()
{
    int a;
    printf("Enter an integer: ");
    scanf("%d", &a);

    if (a > 10)
        printf("a is greater than 10.\n");
    else
        printf("a is less than or equal to 10.\n");
    return 0;
}
```

```
Enter an integer: 20
a is greater than 10.
```

```
Enter an integer: 5
a is less than or equal to 10.
```

Nested if Statements


```
if (expression1)
{
    if (expression2)
        statement1;
    else
        statement2;
}
else
    statement3;
```

Example

```c
#include <stdio.h>
int main()
{
    int a;
    int b;
    printf("Enter two integers: ");
    scanf("%d %d", &a, &b);

    if (a >= b){
        if (a == b)
            printf("%d = %d\n", a, b);
        else
            printf("%d > %d\n", a, b);
    }
    else
        printf("%d < %d\n", a, b);
    return 0;
}
```

```
Enter two integer: 2 2
2 = 2
```

```
Enter two integer: 4 5
4 < 5
```

```
Enter two integer: 9 3
9 > 3
```

Conditional Expression

- Written with the ternary operator " ? : "

```
expression1 ? expression2 : expression3
```

- The `expression1` is evaluated first. If it is true, then the `expression2` is evaluated.
- Otherwise `expression3` is evaluated

```
a > b ? a – b : b – a
```

Example

- Find max(a , b)

```
if (a > b)
   z = a;
   else
      z = b;
```



```
z = a > b ? a : b
```

Find b?

- a = 60;
- b = (a>=50) ? ((a>=60)? ((a>=70)?3:2):1):0;

Multiway Selection

- 2 methods
  - if
  - switch
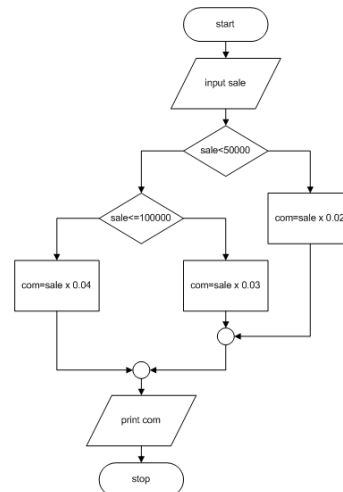
if (Multiway Selection)

```
if (expression.1)
   statement.1
else
   if (expression.2)
      statement.2;
   else
      if (expression.3)
         statement.3;
      else
         ...
         if (expression.n)
            statement.n;
         else
            statement.n+1;
next-statement;
```

Commission Calculator

Sales	Commission
< 50,000	2% of sales
50,000 – 100,000	3% of sales
> 100,000	4% of sales

Example

```c
#include <stdio.h>
#define COM1 0.02
#define COM2 0.03
#define COM3 0.04
int main()
{
   float sale;
   float com;
   printf("Input sale amount: ");
   scanf("%f", &sale);
   if (sale < 50000)
      com = sale*COM1;
   else
      if (sale <= 100000)
         com = sale*COM2;
      else
         com = sale*COM3;
   printf("Commission is %.2f", com);
   return 0;
}
```

```
Input sale amount: 1000000
Commission is 40000.00
```

Remarks (if)

- If there is only one statement between the curly brackets, { }, you can omit the curly brackets.
- Always use the curly brackets, although there is only one statement.
- Don't forget to put the parentheses around the condition.
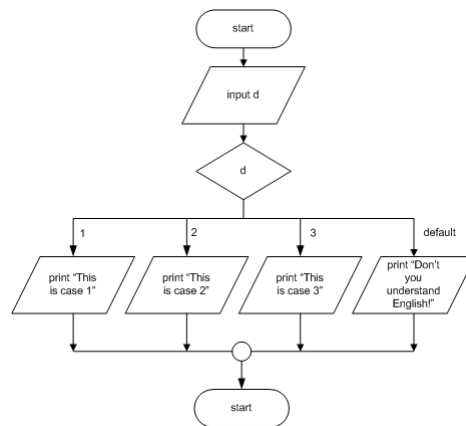
switch (Multiway Selection)

```
switch (expression)
{
   case constant.1:    statement.1;
                       break;
   case constant.2:    statement.2;
                       break;
   case constant.3:    statement.3;
                       break;

   ...

   case constant.n:    statement.n;
                       break;
   default:            statement.n+1;
}
```

Example

Example

```c
#include <stdio.h>
int main()
{
int d;
printf("Enter a number from 1 to 3: ");
scanf("%d", &d);
switch (d)
{
        case 1: printf("This is case 1");
                break;
        case 2: printf("This is case 2");
                break;
        case 3: printf("This is case 3");
                break;
        default: printf("Don't you understand English!");
}
return 0;
}
```

What if we forgot to put "break" after statement?

Example

```c
#include <stdio.h>
int main()
{
int d;
printf("Enter a number from 1 to 3: ");
scanf("%d", &d);
switch (d)
{
        case 1: printf("This is case 1");
                break;
        case 2: printf("This is case 2");
//              break;
        case 3: printf("This is case 3");
                break;
        default: printf("Don't you understand English!");
}
return 0;
}
```

Example
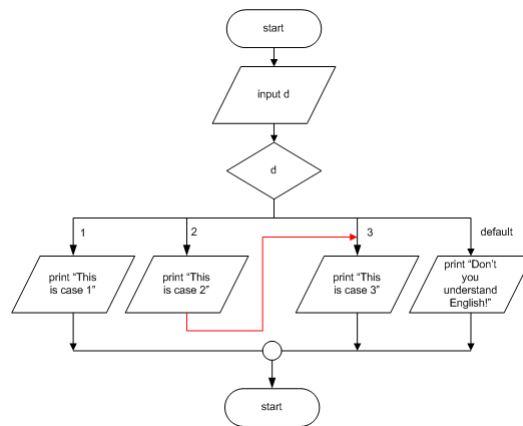
Remarks (switch)

- The switch statement is especially useful when the selection is based on the **value of a single variable or a simple expression**
- The value of this expression may be **int or char but not double**.
- The switch statement can include at most **one default label**. The default label can be coded anywhere, but is traditionally coded last
- Another very common error is the omission of the **break** statement at the end of one alternative.

Using Logical Operator

```
if (x > 0)
   if (y > 0)
   {
      result = x * y;
      printf("x * y = %f", result);
   }
```

```
if (x > 0 && y > 0)
   {
      result = x * y;
      printf("x * y = %f", result);
   }
```

Logical Operator

Operators	Descriptions
&&	And
||	Or
!	Not

Examples

A	B	A&&B	A||B	!A
T	T	T	T	F
T	F	F	T	F
F	T	F	T	T
F	F	F	F	T