ĐẠI HỌC BÁCH KHOA HÀ NỘI
VIỆN CÔNG NGHỆ THÔNG TIN VÀ TRUYỀN THÔNG

BRANCH

SOICT-HUST

if statement

if (*expression*)
    statement

- Determines whether a statement or block is executed.
- Implements the selection instructions within an algorithm.
- Decides what to do by evaluating a Boolean expression.
- If the expression is true (non-zero), the statement or block is executed.

What is a statement?

- Statements are lines of instructions in our programs ending with a semicolon (;).
- A compound statement or block is a series of statements surrounded by braces.

Example

```
{
    number = number + 1;
    printf("%d\n", number);
}
```

- An empty statement is a single semicolon.

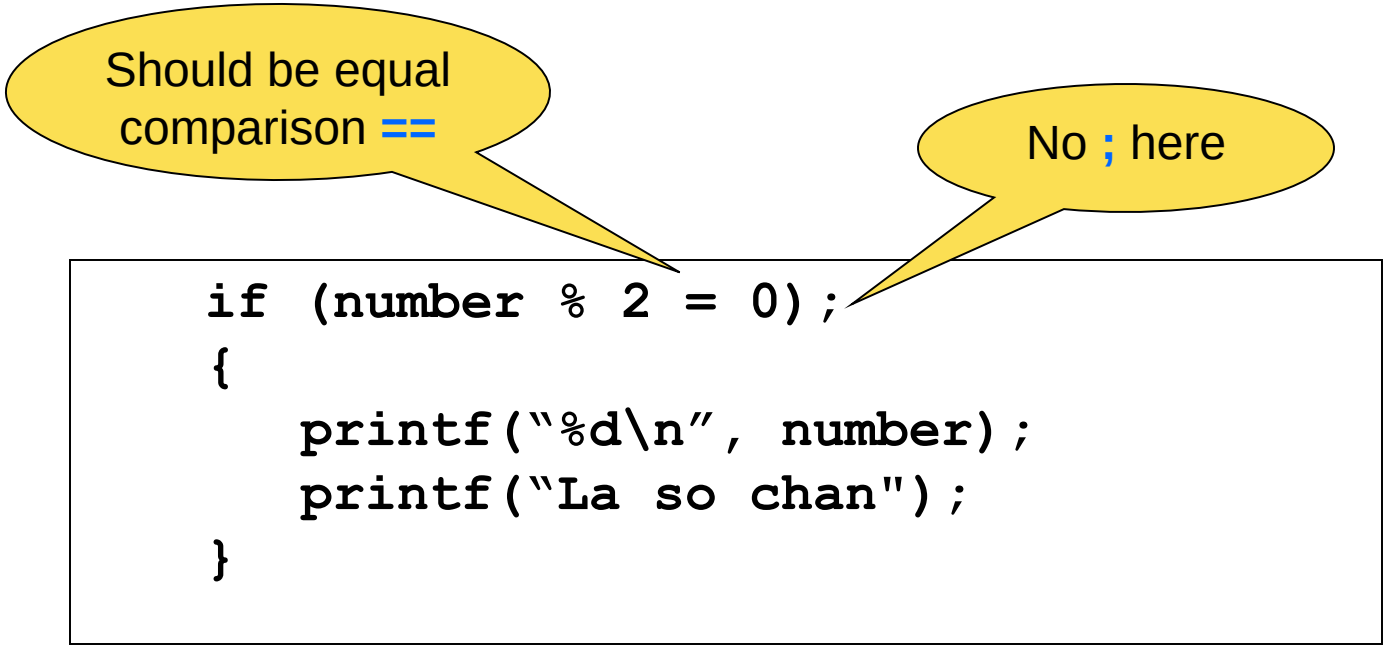
Example

- Read in a number, and echo it if it is odd.

```
#include <stdio.h>
int main()
{
    int number;

    printf("Enter an integer: ");
    scanf("%d", &number);

    if (number % 2 != 0)
        printf("%d is an odd number", number);

    return 0;
}
```

there is no **then** here

Common errors



; creates an empty statement after **if**

else statement

if (*expression*)

statement1

else *statement2*

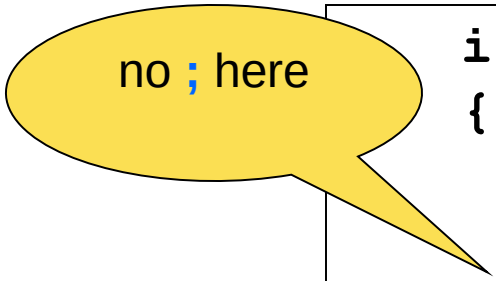
- *else* statement can only occur after an if statement
- *else* statement is only executed when the if block does not execute

Example

- Check whether an interger is odd or even

```
#include <stdio.h>

int main()
{
   int number;

   printf("Enter an integer: ");
   scanf("%d", &number);

   if (number % 2 != 0)
      printf("%d is an odd number\n", number);
   else
      printf("%d is an even number\n", number);

   return 0
}
```

Common errors




```
if (number % 2 != 0)
{
    printf("%d\n", number);
    printf("is an odd number");
};
else
{
    printf("%d\n", number);
    printf("is an even number");
}
```

Cascading if (`else-if`)

```
if (expr1)
    statement1
else if (expr2)
    statement2
else if (expr3)
    statement3
else
    statement4
```

Example

```
if (ch >= 'a' && ch <= 'z')
{
   printf("%c is a lowercase", ch);
}
else if (ch >= 'A' && ch <= 'Z')
{
   printf("%c is a upper case". ch);
}
else if (ch >= '0' && ch <= '9')
{
   printf("%c is a number", ch);
}
```

- Cascading **if**: Multiple alternative blocks but at most only one block will be executed
- Cascading **if** is used when we need to choose one among several conditions

Exercise

1. Write a program to compute the total days of a month

- Algorithm

if (month in September, April, June, November) then
  output “30 days”
else if (month is February)
  output “28 or 29 days”
else output “31 days”

Exercises

2. Write a program to get three numbers from input and print out the maximum of those
3. Write a program to solve $ax^2 + bx + c = 0$
4. Write a program to get two numbers a,b from input and compute $y = 15x^2 + x + 12$, in which:

$$x = \begin{cases} \frac{a+b}{3} + b & if \quad a < b \\ 15{,}172 & if \quad a = b \\ \frac{a-b}{a^2+b^2} & if \quad a > b \end{cases}$$

`switch` statement

```
switch (integer value)
  {
  case 1:  statement1;
           break; /* optional line */
  case 2:  statement2;
           break; /* optional line */
  ....
  default: default statement;
           break; /* optional line */
  }
```

- When a **switch** statement is encountered, the expression in the parentheses is evaluated and the program checks to see whether the result of that expression matches any of the constants labelled with case.
- If a match is made execution will start just after that case statement and will carry on until either the closing brace } is encountered or a *break* statement is found.
- Statements which follow the *default* case are executed for all cases which are not specifically listed.

Example 1

```
printf("Yes/No (Y/N)?");
scanf("%c", &ch)
switch (ch)
{
    case 'y' :
    case 'Y' :
      printf("say yes");
      break;
    default :
      printf("say no");
}
```

Example 2

```
switch (digit){
   case 0 : printf ("zero");
          break;
   case 1 : printf ("one");
          break;
   case 2 : printf ("two");
          break;
   ...
   case 9 : printf ("nine");
          break;
   default:
      printf ("others");
}
```

Exercises

- Display grade of a student based on marks
- diem = 9, 10: excellent
- diem = 7, 8: good
- diem = 5, 6: average
- other: weak

using break

- When a case of the switch statement is found, statements are carried out from this point
- All following statements are carried out until a break statement
- **break** is a handy way of jumping straight out of the switch block

```
int a=1;
switch ( a ) {
    case 1:
        printf("a=1\n");
    case 2:
        printf("a=2\n");
        break;
    case 3:
        printf("a=3\n");
}
```

Output:

a=1

a=2

Exercises

1. Write a program to get two numbers a,b from input and compute $y = 15x^2 + x + 12$, in which:

$$x = \begin{cases} \dfrac{a+b}{3} + b & if \quad a < b \\ 15{,}172 & if \quad a = b \\ \dfrac{a-b}{a^2+b^2} & if \quad a > b \end{cases}$$

2. Write a program to get an integer n ($1 \le n \le 10$) and display the English name of that number. For example, n = 2, display 2 → two.

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