# Control Structures: Selection Statement

Chapter 3

B. Ramamurthy



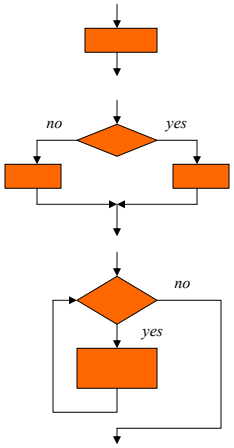
## Introduction

"Two roads divulged in a yellow wood,
And sorry I could not travel both…."

—— Robert Frost
From "The Road Not Taken"

# Structured Programming

- Sequence
- Selection
- Repetition






# Decision Statements (selection)

- How to compare data values?
  - Relational operators
- How to alter the sequence of program execution based on the result?
  - if.. else statements
- How to deal with multiple choices?
  - Switch statement

# Example

- We will use "assigning letter grade based on percentage points" as an example to illustrate selection statement.

| Percent Range | >=90 | >=80 < 90 | >=70 <80 | >=60 <70 | <50 |
|---|---|---|---|---|---|
| Letter Grade | A | B | C | D | F |



# Relational Operators

| Operator | Meaning |
|---|---|
| < | Less than ? |
| > | Greater than ? |
| >= | Greater than or equal to? |
| <= | Less than or equal to? |
| == | Equal to? |
| != | Not Equal to ? |

# Logical Operators

| | |
|---|---|
| **!** | not |
| **&&** | and |
| **\|\|** | or |

These operators are used to combine more than one condition forming a complex condition.



# if Statement

- An if statement allows a program to choose whether or not to execute a following statement.
- Syntax:

if (**condition**)
  **statement**;

- Semantics:

**condition** is a Boolean expression: Something that evaluates to True or False.

If **condition** is true then execute the **statement** is executed.

# The if statement : syntax

```
if(expression)
      statement;        //single statement executed
                        //if expression is true

   if(expression)
   {                    //statements inside {} are
                        //executed if expression is true
         statement1;
         statement2;
         ...
         statement n;
   }
```



# If -else Statement

- An if-else statement allows a program to do one thing if a condition is true and a different thing if the condition is false.
- Syntax:

```
if ( condition )
  statement1
else
  statement2
```

- Statements to be executed for if and else can be a single statement or multiple statements enclosed in { }.

# The if - else statement: syntax

```
if(expression)
   statement;
else
   statement;

if(expression)
    {
        statement block
    }
else
    {
        statement block
    }
```



# The switch statement

```
switch(expression)
{
    case constant:
            statement(s);
            break;
    case constant:
            statement(s);
            break;
     /* default is optional*/
    default:
            statement(s);
}
```

# The switch statement

- *Expression* must be of type integer or character
- The keyword **case** must be followed by a *constant*
- **break** statement is required unless you want all subsequent statements to be executed.



# Practice!

Convert these nested **if/else** statements to a **switch** statement:

```
if (rank==1 || rank==2)
  cout << "Lower division \n";
else
{  if (rank==3 || rank==4)
       cout << "Upper division \n";
   else
   {   if (rank==5)
           cout << "Graduate student \n";
       else
           cout << "Invalid rank \n";
   }
}
```

# Practice Solution!

```
switch(rank)

{
  case 1: case 2:
    cout << "Lower division \n";
    break;
  case 3: case 4:
    cout << "Upper division \n";
    break;
  case 5:
    cout << "Graduate student \n";
    break;
  default:
    cout << "Invalid rank \n";
}//end switch
```



# Summary

- In many applications, choices are to be made depending on some conditions related to the problem. Selection or decision structures are used to model such situations.
- C++ supports the implementation of "selection" through the "if" and "switch" statements. In this discussion we looked at various forms of selection statements.