

## Flow of Control

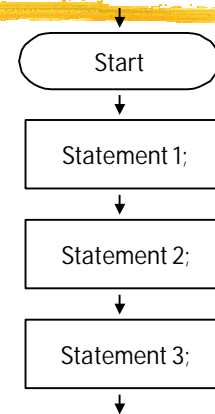
- **Definition: The sequence in which the computer executes statements of the program.**
- **Sequential Control Structure**
- **Selection (Branching) Control Structure**
  - Relational and Logical Operators
- **Repetition (Loop) Control Structure**
  - while loops
  - for loops

1

Copyright © 2002 R.M. Laurie

## Sequential Control Structure

- **The Sequential Control Structure is simply the execution of program instructions from the top to bottom.**
- **It is characterized by a flow chart construct without branches.**



2

Copyright © 2002 R.M. Laurie

## Selection Control Structure

- **The Selection Control Structure**
  - Branching Control Structure
  - Conditional Control Structure
- **Decision making control**
- **Tests an Assertion Statement**
  - Evaluated as True or False (Humans)
  - Evaluated as Yes or No (Humans)
  - Evaluated as 1 or 0 (Computers)

3

Copyright © 2002 R.M. Laurie

## Relational Operators

- **Relational operators are used to compare two data objects.**
- **The result of the comparison is either true (1) or false (0).**

== Equal to	!= Not Equal to
> Greater	>= Greater or Equal
< Less	<= Less or Equal
- **Note the difference between == and = operator**

4

Copyright © 2002 R.M. Laurie

## Arithmetic Operators Precedence (Highest to Lowest)

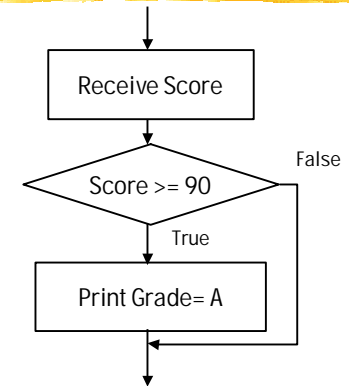
- ( ) Defines order of operation
- Minus (unary)
- \* / % Multiply, Division, Remainder
- + - Addition, Subtraction
- < <= > >= } Relational Operators
- == !=
- = Assignment

5

Copyright © 2002 R.M. Laurie

## if Selection Control Structure

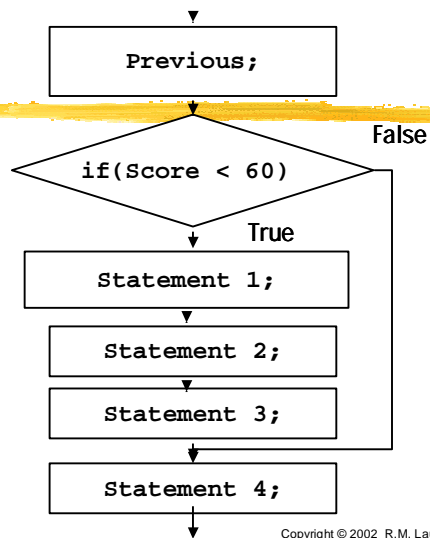
- Characterized by a diamond shaped flow chart construct, containing an assertions with two possible outcomes (True or False).



6

Copyright © 2002 R.M. Laurie

*if  
Compound  
Selection  
Control  
Structure*



7

Copyright © 2002 R.M. Laurie

## if Selection Control Structure (Compound statement syntax)

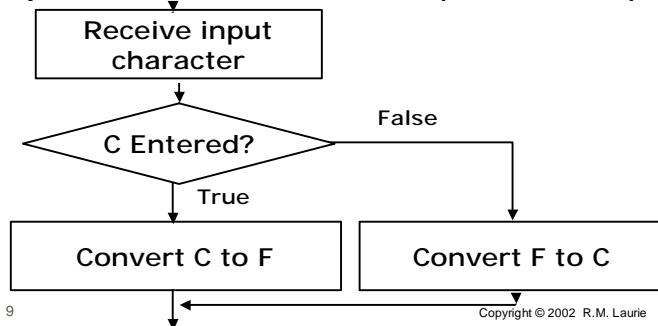
```
Previous;  
if(Score < 60)  
{  
    Statement 1;  
    Statement 2;  
    Statement 3;  
}  
Statement 4;
```

8

Copyright © 2002 R.M. Laurie

## if - else Selection Structure

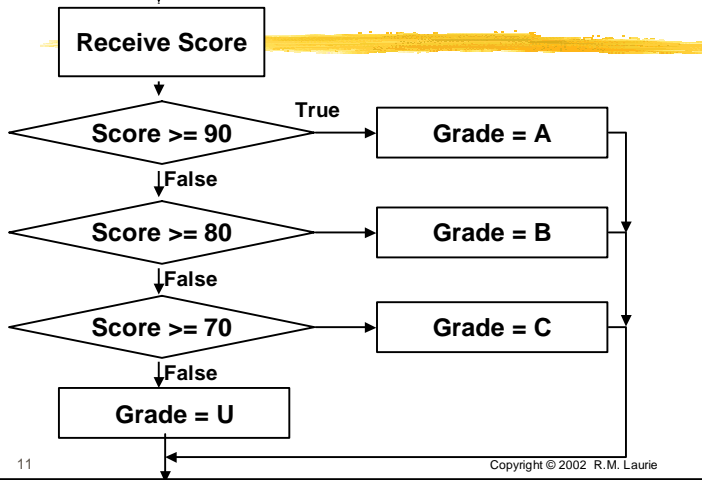
- Characterized by a diamond shaped flow chart construct, containing an assertions with two possible outcomes branches (True or False).



## if - else Selection Structure

```
Prompt and receive statement;  
if(Question == 'c')  
{  
    Prompt and receive degrees C;  
    Convert from C to F  
    Output Results;  
}  
else  
{  
    Prompt and receive degrees F;  
    Convert from F to C  
    Output results;  
}  
More statements;
```

## if - else if - else Structure



```
<HTML><HEAD>  
<TITLE>Grade Determination</TITLE>  
<SCRIPT LANGUAGE = "JavaScript">  
    var Score, Grade;  
    Score = parseFloat(window.prompt( "Enter Score", "0" ));  
    if(Score >= 90)  
        Grade = 'A';  
    else if(Score >= 80)  
        Grade = 'B';  
    else if(Score >= 70)  
        Grade = 'C';  
    else  
        Grade = 'U';  
    document.writeln("<H2>For the score = " + Score  
        + " <BR>Your letter grade is " + Grade + "</H2>");  
</SCRIPT>  
</HEAD>  
<BODY><P>Click Refresh (or Reload) to run the script again</P>  
</BODY></HTML>
```

## Problem Solving Phase

- Write Program Specifications
  - Analysis of requirements
  - Program specifications description
    - Describe what the goals of the program
    - Describe appearance of input and output
- Algorithm Design
  - Mathematical Analysis and Algorithm
  - Flow Chart to describe event sequencing
- Verify algorithm
  - Test with known data
  - Solve manually

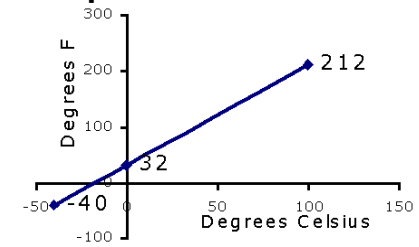
13

Copyright © 2002 R.M. Laurie

## Algorithm Design - Mathematical

### ■ Mathematical Description

- Boiling point  
F = 212  
C = 100
- Freezing point  
F = 32  
C = 0



$$Y = MX + B$$

$$\begin{aligned} F &= (180 / 100) C + 32 \\ &= (9/5) C + 32 \\ &= 1.8 C + 32 \end{aligned}$$

14

Copyright © 2002 R.M. Laurie

## Verify Algorithm

- Testing with known data
  - Boiling point  
F = 212      C = 100
  - Freezing point  
F = 32      C = 0
  - Collect Data
    - Bank thermometer
    - Radio weather report
- Solve manually by hand using calculator

15

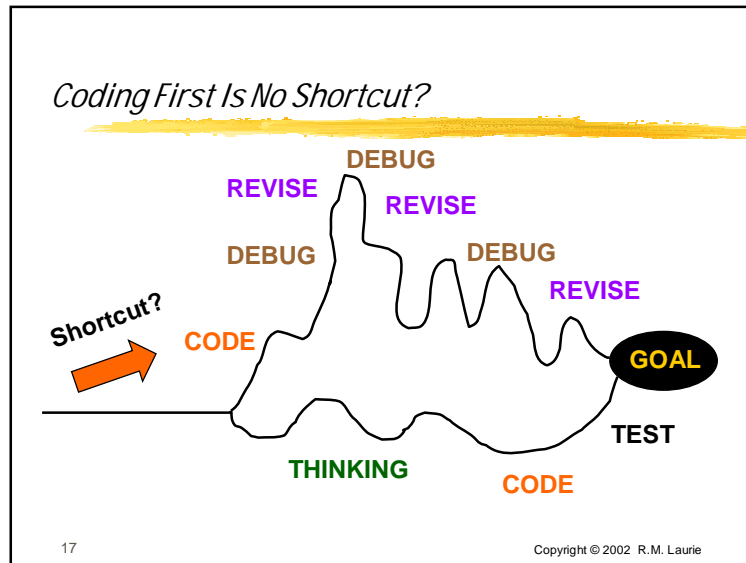
Copyright © 2002 R.M. Laurie

## Implementation Phase

- Translate Algorithm into Code
  - Create source code file with syntax of JavaScript language and HTML
  - Run to detect *syntax errors*
- Test Program
  - Test with known data
  - Detects program *logic errors*
  - Often requires several iterations
  - May require re-evaluation of specifications and algorithms

16

Copyright © 2002 R.M. Laurie



## Project 2: Part B

- **Create a JavaScript program that will convert temperatures between the Fahrenheit and Celsius systems**
    - Prompt for which Conversion
    - Prompt for the temperature (decimal values)
  - **Display in the browser window:**
    - The original temperature and unit
    - The final temperature and unit
    - Format the output as you wish
    - Display your name in the browser window
  - **Print code and browser display**
- Copyright © 2002 R.M. Laurie