

Flow of Control

- ❖ **Definition:** The sequential execution of statements in a program
 - ◆ **Sequential Control Structure (Top-Bottom)**
 - ◆ It is characterized by a flow chart construct without branches.
 - ◆ **Selection Control Structure (Branching)**
 - ◆ 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)

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Relational Operators

- ❖ Relational operators are used to compare two data objects.
- ❖ The result of the comparison is either **true** or **false**.
 - ==** Equal to **!=** Not Equal to
 - >** Greater **>=** Greater or Equal
 - <** Less **<=** Less or Equal
- ❖ Note the difference between **==** and **=** operator

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Arithmetic Operators Precedence

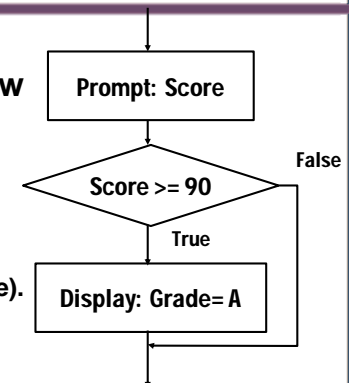
(Highest to Lowest)

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

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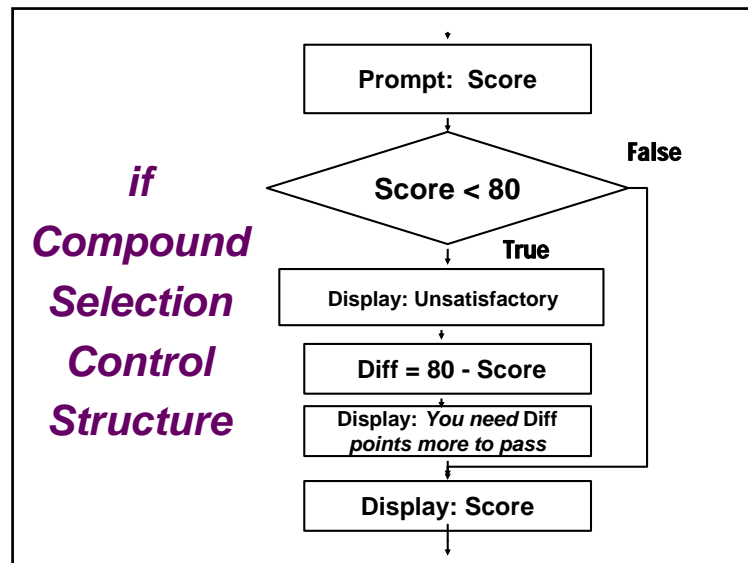
if Selection Control Structure

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



```
if(Score >= 90)
    document.write("Grade = A");
```

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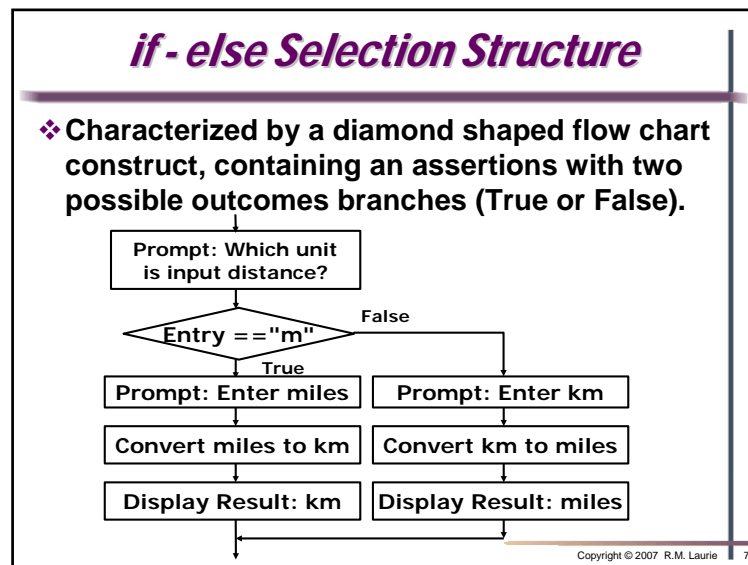


if Selection Control Structure
(Compound statement syntax)

```

Score = parseFloat(window.prompt( "Enter Score", "0" ));
if(Score < 80)
{
    document.writeln("<h2 style='color: #CC0000'\>"
        + "Exam Result Unsatisfactory</h2>");
    Diff = 80 - Score;
    document.writeln("<p>You need " + Diff
        + " to continue to next chapter</p>");
}
document.writeln("<p>You Exam Score was " + Score
    + "</p>");
    
```

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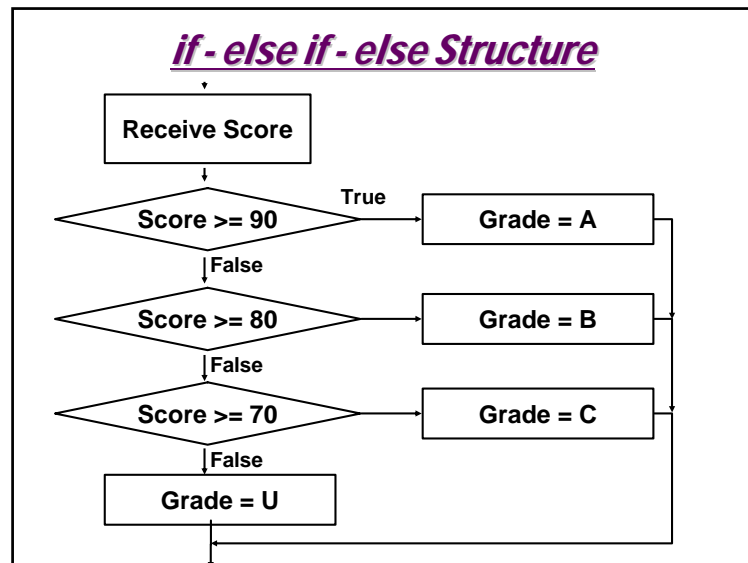
if - else Structure Selection

```

<head>
<script type="text/javascript">
    var Entry, Result;
    Entry = window.prompt("Is input distance miles or km? (m or k)", "m");
    if(Entry == "m")
    {
        Entry = parseFloat(window.prompt("Enter miles: ", "0"));
        Result = Entry * 1.609;
        document.writeln("<p>"+Entry+" miles = "+Result+" km</p>");
    }
    else
    {
        Entry = parseFloat(window.prompt("Enter kilometers: ", "0"));
        Result = Entry / 1.609;
        document.writeln("<p>"+Entry+" km = "+Result+" miles</p>");
    }
    document.writeln("<p>Reload for another conversion</p>");
</script>
</head>
<body>
</body>
    
```

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Slide Set 4: Selection Structure



```
<head>
<title>Grade Determination</title>
<script type="text/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>
```

Design 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

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Algorithm Design - Mathematical

- ❖ Mathematical Description
 - ◆ Boiling point
F = 212
C = 100
 - ◆ Freezing point
F = 32
C = 0

The graph shows a linear relationship between Fahrenheit (F) and Celsius (C) temperatures. The x-axis is labeled 'Degrees Celsius' and ranges from -50 to 150. The y-axis is labeled 'Degrees F' and ranges from -100 to 300. A blue line passes through the points (0, 32) and (100, 212), which are labeled on the graph.

$Y = MX + B$

$$F = (180 / 100) C + 32$$
$$= (9/5) C + 32$$
$$= 1.8 C + 32$$

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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

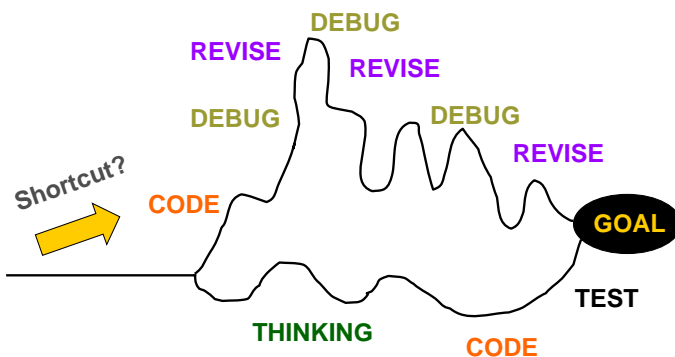
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Implementation Phase

- ❖ 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

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Coding First Is No Shortcut?



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Conditional Exercises

- ❖ Create program that converts temperatures between Fahrenheit and Celsius number systems
 - ◆ Prompt for which Conversion to perform
 - ◆ Prompt for the temperature to convert
 - ◆ Convert and display the results
- ❖ Create an employee's pay program
 - ◆ Prompt for name, pay rate, and hours
 - ◆ Overtime rate is 1.5x normal pay rate
 - ◆ Subtract 15% withholding tax
 - ◆ Calculate pay check amount

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