

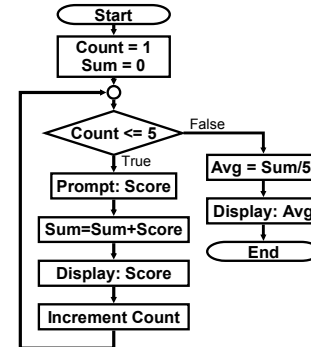
## Flow of Control

- ❖ **Definition:** The sequential execution of statements in a program
  - ◆ Sequential Control Structure (Top-Bottom)
  - ◆ Selection Control Structure (Decisions)
  - ◆ Repetition Control Structure (Looping)
    - ◆ Loop back and repeats code execution
    - ◆ Relational and Logical Operators
    - ◆ Tests an Assertion (T/F) to loop again or exit
    - ◆ Counter controlled or Sentinel controlled loops
    - ◆ Keywords: **while** **do while** **for**
    - ◆ Computers Never Get Bored
      - Best for iterative well structured processing
      - Not well suited for creative problem solving

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## Repetition (Loop) Structure

- ❖ Repeat a sequence of instructions in a loop
- ❖ The simplest loop structure is the while( )
- ❖ Beware of infinite loops, exit must occur!



```

var fScore, nCount = 1, fSum = 0;
while(nCount <= 5)
{
    fScore = parseFloat(window.prompt(
        "Enter Score "+ nCount,"0"));
    fSum = fSum + fScore;
    document.write("<p>Score "+nCount
        +" = " + fScore+"</p>");
    nCount = nCount + 1;
}
document.write("<h3>Average = "
    +(fSum/5) + "</h3>");
    
```

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## while statement loop control

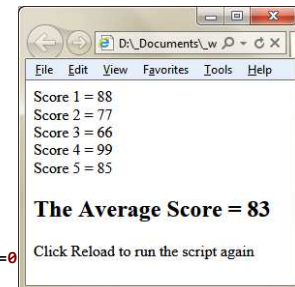
- ❖ Contents of loop executed repeatedly while(assertion) is **true**
- ❖ Loop terminated when while(assertion) is **false**
- ❖ **Counter-Controlled Repetition Structure**
  - ◆ Initialize a counter to count loops
  - ◆ Increment or decrement counter
  - ◆ while(assertion) checks for total loops reached
- ❖ **Sentinel-Controlled Repetition Structure**
  - ◆ while(assertion) checks for a **sentinel** termination value

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## Counter-Controlled Pre-test Repetition Structure

```

<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>Counter Controlled Loop</title>
<script>
var nScore=0, nScoreTotal=0, nCount=0
while(nCount < 5)
{
    nScore=parseInt(window.prompt("Enter Score", ""));
    nScoreTotal = nScoreTotal + nScore;
    nCount = nCount + 1;
    document.write("Score " + nCount + " = " + nScore + "<br>");
}
document.write("<h2>The Average Score = " + nScoreTotal/5 + "</h2>");
</script>
</head>
<body>
<p>Click Reload to run the script again</p>
</body>
</html>
    
```

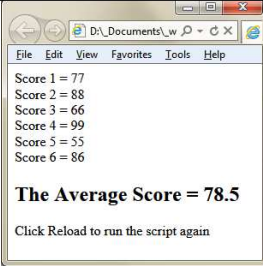


1. Define counter
2. Initialize counter
3. Increment counter

## Slide Set 5: Javascript-Loop

### Sentinel-Controlled Pre-test Repetition Structure

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <title>Sentinel Controlled Loop</title>
    <script>
      var fScore, fScoreTotal=0;
      var nCount=0;
      fScore = parseFloat(window.prompt("Enter Score (-1 to end)", ""));
      while(fScore >= 0)
      {
        fScoreTotal = fScoreTotal + fScore;
        nCount = nCount + 1;
        document.writeln("Score " + nCount + " = " + fScore + "<br>");
        Score = parseFloat(window.prompt("Enter Score (-1 to end)", ""));
      }
      document.writeln("<h2>The Average Score = "
        + fScoreTotal/nCount + "</h2>");
    </script>
  </head>
  <body>
    <p>Click Reload to run the script again</p>
  </body>
</html>
```



Score 1 = 77  
Score 2 = 88  
Score 3 = 66  
Score 4 = 99  
Score 5 = 55  
Score 6 = 86

**The Average Score = 78.5**

Click Reload to run the script again

**What is sentinel?  
What are advantages?**

### Linking to External JavaScript File

```
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <title>External File Linking</title>
    <script src="MyProg.js"></script>
  </head>
  <body>
    <p>Click reload to run again</p>
  </body>
</html>
```

**MyProg.js**

```
var fScore = parseFloat(window.prompt("Enter Score", "0"));
if(fScore < 80)
{
  document.write("<h2 style='color: #CC0000'"
    + "Exam Result Unsatisfactory</h2>");
  var fDiff = 80 - fScore;
  document.write("<p>You need " + fDiff + " point(s) more"
    + " to continue to next chapter</p>");
}
document.write("<p>Your Exam Score was " + fScore + "</p>");
```

## More JavaScript Operators

- ++ Increment** (Unary)
 

```
Number++; // Number = Number + 1;
```
- Decrement** (Unary)
 

```
Number--; // Number = Number - 1;
```
- Object Property** (Encapsulated in object)
 

Select property or method of an object.

```
document.write("<h3>Average = "
  + (Sum / 5) + "</h3>");
```
- Combined Assignment**
  - += Addition Assignment Operator**
  - = Subtraction Assignment Operator**
  - \*= Multiplication Assignment Operator**
  - /= Division Assignment Operator**
  - %= Remainder Assignment Operator**

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## Operator Examples

```
Num++; // Num=Num+1 (Post-increment)
++Num; // Num=Num+1 (Pre-increment)
Num--; // Num=Num-1 (Post-decrement)
--Num; // Num=Num-1 (Pre-decrement)
```

```
A += 2; // A=A+2
B -= 1; // B=B-1
C *= 4; // C=C*4
D /= 2; // D=D/2
E %= 5; // E=E%5
```

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## Operators Precedence

(Highest to Lowest)

.	Property access of an object
( )	Defines order of operation
- ++ --	Minus, Increment, Decrement
!	Logical NOT Operator
* / %	Multiply, Division, Remainder
+ -	Addition, Subtraction
< <= > >=	} Relational Operators
== !=	
&&	Logical AND Operator
	Logical OR Operator
= += -= *= /= %=	Compound Assignment

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## Logical Operator Examples

```

if(A==B && A==C)
while(!Valid)
if(A = 0) // Error use ==
else if(!(A || B))
while(!A && !B)
A <= B || C == D
A = B == 0;
if(Question == "C" || Question == "c")
while(SSN > 999999999 || SSN < 0)
if(Tax == 0 || Tax == 15 || Tax == 28)
    
```

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## Counter-Controlled Loop with ++ and +=

```

<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <title>++ += Counter Controlled Program</title>
    <script src="CounterControlLoop.js"></script>
  </head>
  <body> <p>Click Reload to run the script again</p> </body>
</html>
    
```

CounterControlLoop.js external linked file

```

var nScore = 0, nScoreTotal = 0, nCount = 0;
while(nCount < 5)
{
  nScore = parseInt(window.prompt("Enter Score", ""));
  nScoreTotal += nScore; // ScoreTotal = ScoreTotal + Score;
  nCount++; // was Count = Count + 1;
  document.write("Score " + nCount + " = " + nScore + "<br>");
}
document.write("<h2>The Average Score = "+nScoreTotal/5 +"</h2>")
    
```

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## Input Data Validation Application

**Pre-test while( ) Loop  
Restricts user to enter  
only valid input data  
Sentinel Controlled**

```

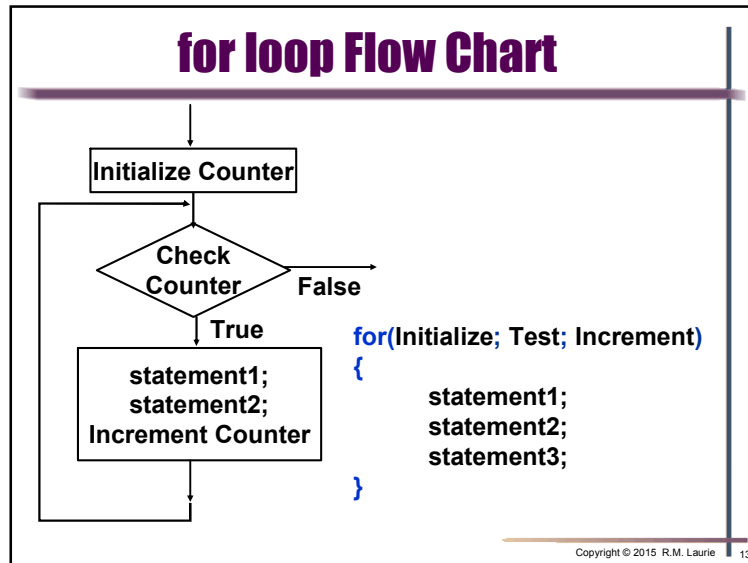
<!DOCTYPE html>
<html lang="en">
  <head>
    <meta charset="utf-8">
    <title>Filtered Input</title>
    <script src="FilterEntry.js"></script>
  </head>
  <body>
  </body>
</html>
    
```

FilterEntry.js

```

var sEntry, bValid=false;
while(bValid == false) {
  sEntry = window.prompt( "Do you like Programming? (y or n)", "" );
  if(sEntry == "y") {
    document.writeln("<h2>I\'m glad you like programming!</h2>");
    bValid = true;
  }
  else if(sEntry == "n") {
    document.writeln("<h2>You will like it if you study.</h2>");
    bValid = true;
  }
  else
    window.alert("You must enter either y or n !");
} // <-- Note that this is the end of the while loop
    
```

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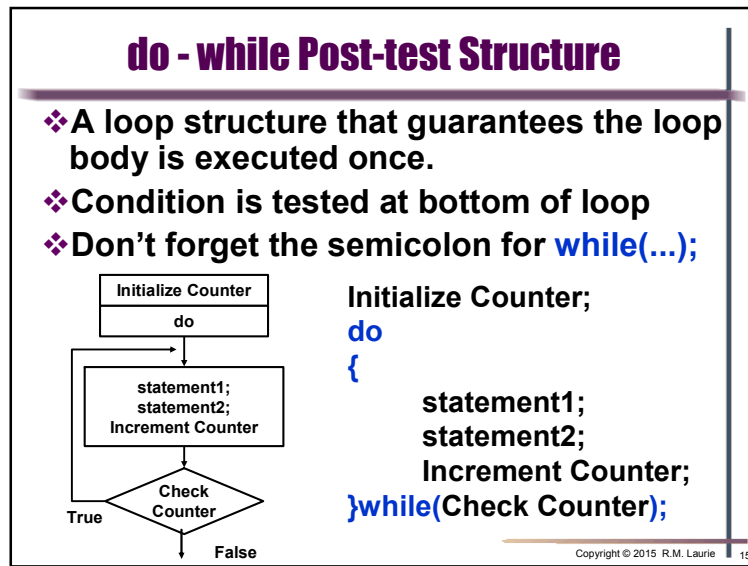


## For( ) Counter Controlled Loop Example

```

<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>Average Calculation 2</title>
<script>
var nScore, nScoreTotal = 0, nCount, nQty;
nQty = parseInt(window.prompt("How Many Scores?", ""));
for(nCount = 1; nCount <= nQty; nCount++)
{
    nScore = parseInt(window.prompt("Enter Score", ""));
    nScoreTotal = nScoreTotal + nScore;
    document.write("Score " + nCount + " = "
        + nScore + "<br/>");
}
document.write("<h2>The Average Score = "
    + (nScoreTotal / nQty) + "</h2>");
</script>
</head>
<body>
</body>
</html>
    
```

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## Sentinel Controlled Loop Example

```

<!DOCTYPE html>
<html lang="en">
<head>
<meta charset="utf-8">
<title>Average Calculation 2</title>
<script>
var nScore, nCount=0, nTotal = 0;
do
{
    nScore = parseInt(window.prompt("Enter Score or [Q]=quit", "Q"));
    if(isNaN(nScore)); // Score is Not a Number
    else if(nScore < 0)
        window.alert("Score cannot be negative");
    else
    {
        nTotal += nScore;
        nCount++;
        document.write("<p>Score " + nCount+" = " + nScore + "</p>");
    }
}while(!isNaN(nScore));
document.write("<h2>Average Score = " + nTotal/nCount + "</h2>");
</script>
</head>
<body>
</body>
</html>
    
```

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