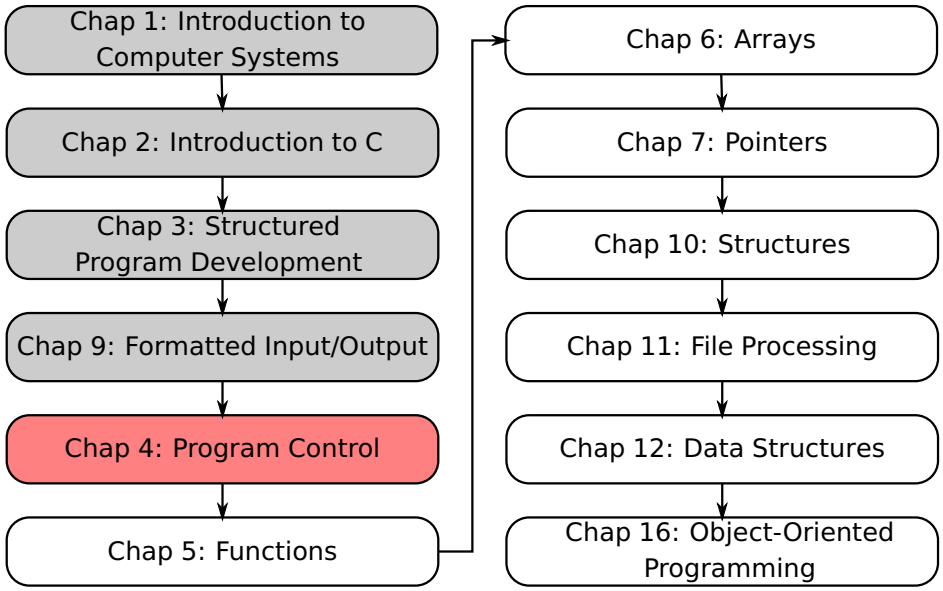
Computer Programming 143 – Lecture 8
Program Flow Control II

Electrical and Electronic Engineering Department
University of Stellenbosch

Corné van Daalen
Thinus Booysen
Willie Smit
Willem Jordaan

Module Overview



Lecture Overview

4.8 The `do...while` Repetition Statement I

The `do...while` repetition statement

- Similar to the while structure
- Condition for repetition tested after the body of the loop is performed
  - All actions are performed at least once
- Format:

```
do {
    statement(s);
} while ( condition );
```

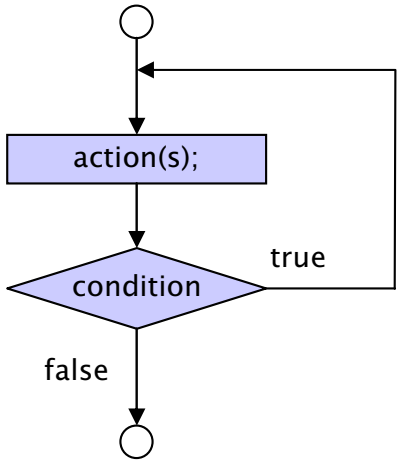
4.8 The do...while Repetition Statement II

Example:

```
counter = 1;
do {
    printf( "%d  ", counter );
} while (++counter <= 10);
```

- Prints the integers from 1 to 10

4.8 The do...while Repetition Statement III



4.10 Logical Operators I

&& (logical AND)

- Returns **true** if both conditions are **true**

|| (logical OR)

- Returns **true** if either of its conditions are **true**

! (logical NOT, logical negation)

- Reverses the truth/falsity of its condition
- Unary operator, has one operand

Useful as conditions in loops

if ((2<x) && (x<7)) *equivalent to* $(2 < x < 7)$
or to calculate a student's final mark:

```
Pass = (0.15*S+0.35*A1+0.5*A2>=50)||(0.15*S+0.35*A1+0.5*A3>=50);
```


4.10 Logical Operators II

&& (logical AND)

```
    0     &&     0     = 0
nonzero   &&     0     = 0
    0     && nonzero = 0
nonzero   && nonzero = 1
```

|| (logical OR)

```
    0     ||     0     = 0
nonzero   ||     0     = 1
    0     || nonzero = 1
nonzero   || nonzero = 1
```

! (logical NOT, logical negation)

```
   !0    = 1
!nonzero = 0
```

4.10 Example: do...while and logical operators I

Problem statement

As part of a survey, read the user's level of happiness on a scale of 1 to 10 and inform the user whether he/she has a normal (3 to 8) or abnormal (1, 2, 9 or 10) level of happiness. Ensure that the user enters a valid level.

Pseudocode

Do
    Read user's level of happiness
Until the user has input a valid level

If the user has a normal level of happiness
    Inform the user that his/her happiness level is normal
Else
    Inform the user that his/her happiness level is abnormal

4.10 Example: do...while and logical operators II

C code

```c
/* HappinessMeter.c
 * Program that measures your level of happiness */
#include <stdio.h>
#include <stdlib.h>

int main( void )
{
   int happiness; // the store of happiness

   setbuf(stdout, 0);

   // Repeatedly reads happiness level from user until 1 <= level <= 10
   do {
      printf( "Enter your happiness level on a scale of 1 to 10: " );
      scanf( "%d", &happiness ); // reads the user's level of happiness
   } while ( (happiness < 1 )|| (happiness > 10) );
   // repeat if invalid level entered
```


4.10 Example: do...while and logical operators III

C code

```c
   if ( (happiness >= 3) && (happiness <= 8) ) { // if happiness in [3..8]
      printf( "You are normal - congratulations!");
   } // end if
   else { // if happiness is not in [3..8]
      printf( "You are either very happy or very sad - seek help!\n");
   } // end else

   return 0; // indicates program ended successfully
} // end function main
```


4.10 Example: do...while and logical operators IV

Output

```
Enter your level of happiness on a scale of 1 to 10: 0
Enter your level of happiness on a scale of 1 to 10: 11
Enter your level of happiness on a scale of 1 to 10: 1
You are either very happy or very sad - seek help!
```

Output

```
Enter your level of happiness on a scale of 1 to 10: 5
You are normal - congratulations!
```

4.10 Example: nested loops and logical operators I

What does the following code do?

```
int i, j;
for ( i = 1; i <= 7; i++ ) {
  for ( j = 1; j <= 7; j++ ) {
     if ( !( i == 4 || j == 4 ) ) {
        printf( "* " );
     }
     else {
        printf( "  ");
     }
  }
  printf( "\n" );
}
```


4.10 Example: nested loops and logical operators II

Output

```
* * *   * * *
* * *   * * *
* * *   * * *

* * *   * * *
* * *   * * *
* * *   * * *
```


4.11 Confusing Equality and Assignment Operators I

Equality operator

```
if ( payCode == 4 ) {
   printf( "You get a bonus!" );
}
```

- Displays "You get a bonus!" if variable payCode has value 4

Assignment operator in stead of equality operator

```
if ( payCode = 4 ) {
   printf( "You get a bonus!" );
}
```

- Stores 4 in variable payCode and displays "You get a bonus!"

4.11 Confusing Equality and Assignment Operators II

Equality operator in stead of assignment operator

```
x = 1;
```

- Assigns a value of 1 to variable x

```
x == 1;
```

- Tests if variable x is equal to 1, but does not change its value

Perspective

Today

Program Flow Control II

- `do...while` repetition structure
- Logical operators
- Confusing equality and assignment operators

Next lecture

Program Flow Control III

- `switch` selection structure

Homework

1. Study Sections 4.8, 4.10, 4.11 in Deitel & Deitel
2. Do Self Review Exercises 4.2(c)&(d) in Deitel & Deitel
3. Do Exercises 4.5(f), 4.29, 4.36 in Deitel & Deitel