EECS 10: Computational Methods in Electrical and Computer Engineering

Lecture 6

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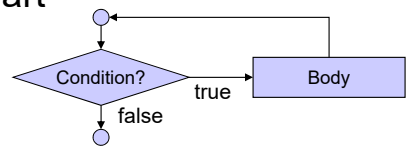
Lecture 6: Overview

- Repetition Statements
  - Example **`Average2.c`**
- Review
  - Lecture 1: Course administration, setup, Linux
  - Lecture 2: Introduction to C programming
  - Lecture 3: Program structure, basic types and operators
  - Lecture 4: Arithmetic expressions
  - Lecture 5: Conditional operators, statements
  - Lecture 6: Repetition statements
- Review Quiz

Repetition Statements

- Repetition (aka. iteration, loop)
  - repeated execution of a block of statements
  - counter-controlled
    - counter determines number of repetitions (often predefined at compile time)
  - sentinel-controlled
    - sentinel condition determines number of repetitions (usually determined at run time)
- Control flow chart



Repetition Statements

- Explicit control flow in loops
  - **`break`** statement
    - exits the innermost loop
  - **`continue`** statement
    - jump back to the beginning of the innermost loop
- Example:

```
int i = 0;
int s = 0;
while (1)           /* “endless” loop */
  { i++;
    if (i > 10)
       { break; }   /* exit the loop */
    if (i % 2 == 1)
       { continue; }/* next iteration */
    s += i;
   } /* elihw */
printf(“%d”, s);
```

Example Program

- Average of values: **`Average2.c`** (part 1/3)

```
/* Average2.c: compute the average of a set of numbers  */
/*                                                      */
/* author: Rainer Doemer                                */
/*                                                      */
/* modifications:                                       */
/* 10/10/04 RD  sentinel controlled loop                */
/* 10/10/04 RD  initial version                         */

#include <stdio.h>

/* main function */

int main(void)
{
   /* variable definitions */
   int    counter;
   double value;
   double total;
   double average;
...
```


Example Program

- Average of values: **`Average2.c`** (part 2/3)

```
...

   /* input and computation section */
   counter = 0;
   total = 0.0;
   while (1)
      { printf("Please enter a value (or -1 to quit): ");
        scanf("%lf", &value);
        if (value == -1.0)
           { break;
            } /* fi */
        total += value;
        counter++;
       } /* elihw */

...
```

Example Program

- Average of values: **`Average2.c`** (part 3/3)

```
...

   /* computation and output section */
   printf("%d values entered.\n", counter);
   if (counter >= 1)
      { average = total / (double)counter;
        printf("The average is %f.\n", average);
       } /* fi */

   /* exit */
   return 0;
} /* end of main */

/* EOF */
```


Example Program

- Example session: **`Average2.c`**

```
% vi Average2.c
% gcc Average2.c -o Average2 -Wall -ansi
% ./Average2
Please enter a value (or -1 to quit): 2
Please enter a value (or -1 to quit): 3
Please enter a value (or -1 to quit): 4
Please enter a value (or -1 to quit): 5
Please enter a value (or -1 to quit): -1
4 values entered.
The average is 3.500000.
% ./Average2
Please enter a value (or -1 to quit): -1
0 values entered.
%
```

Quiz: Question 16

- Today's computers run at which clock speed?
  a) 85 MPH
  b) 1 kHz
  c) 1 ms
  d) 1 GHz
  e) 1 MHz

Quiz: Question 16

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  c) 1 ms
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Quiz: Question 17

- Which of the following constructs are valid type names in C? (Check all that apply!)
  a) `short char`
  b) `long double`
  c) `signed long int`
  d) `unsigned float`
  e) `signed integer`

Quiz: Question 17

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  a) `short char`
  b) `long double`
  c) `signed long int`
  d) `unsigned float`
  e) `signed integer`

Quiz: Question 18

- Assume **i** is a variable of type **int** and **d** is a variable of type **double**. Which statement is true for the following assignment? (Check all that apply!)

```
i = (int)d;
```

a) The comparison checks whether **d** is an integer.
b) The precision of **i** is doubled.
c) The parentheses should go around **d**.
d) The value in **d** is converted to an integer value and then assigned to **i**.
e) Any fractional part in **d** is truncated off.

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e) Any fractional part in **d** is truncated off.

Quiz: Question 19

- Which of the following statements correctly computes the polynomial $p = 2x^2 - 3x + 4$? (Check all that apply!)

a) `p = 2x^2 - 3x + 4;`
b) `p = 2xx - 3x + 4;`
c) `p = x*x*2 - 3*x + 4.0;`
d) `p = 2*(x*x + 3)*x + 4;`
e) `p = (2*x - 3)*x + 4;`

Quiz: Question 19

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b) `p = 2xx - 3x + 4;`
c) `p = x*x*2 - 3*x + 4.0;`
d) `p = 2*(x*x + 3)*x + 4;`
e) `p = (2*x - 3)*x + 4;`

Quiz: Question 20

- Which of the following names are valid keywords in C? (Check all that apply!)

a) **`do`**
b) **`when`**
c) **`void`**
d) **`main`**
e) **`Int`**

Quiz: Question 20

- Which of the following names are valid keywords in C? (Check all that apply!)

a) **`do`**
b) **`when`**
c) **`void`**
d) **`main`**
e) **`Int`**

Quiz: Question 21

- Which of the following names are valid identifiers in C? (Check all that apply!)

a) `xyz123`
b) `IBM`
c) `dollar amount`
d) `My_Very_Long_Variable_Name`
e) `2fast4you`

Quiz: Question 21

- Which of the following names are valid identifiers in C? (Check all that apply!)

a) `xyz123`
b) `IBM`
c) `dollar amount`
d) `My_Very_Long_Variable_Name`
e) `2fast4you`

Quiz: Question 22

- What is the result of the evaluation of the following expression?

```
1 == 2 || 3 < 4 && 5 > 6
```

a) **123456**
b) **true**
c) **false**
d) **1**
e) **0**

Quiz: Question 22

- What is the result of the evaluation of the following expression?

```
1 == 2 || 3 < 4 && 5 > 6
```

a) **123456**
b) **true**
c) **false**
d) **1**
e) **0**

Quiz: Question 23

- What is the result of the evaluation of the following expression?

```
17 < 42 ? 17 : 42
```

a) **1742**
b) **17**
c) **42**
d) **true**
e) **false**

Quiz: Question 23

- What is the result of the evaluation of the following expression?

```
17 < 42 ? 17 : 42
```

a) **1742**
b) **17**
c) **42**
d) **true**
e) **false**

Quiz: Question 24

- For integer **x = 1** at the beginning, what is the value of x after the following statement?

```
x += x + 1;
```

a) **0**
b) **1**
c) **2**
d) **3**
e) **4**

Quiz: Question 24

- For integer **x = 1** at the beginning, what is the value of x after the following statement?

```
x += x + 1;
```

a) **0**
b) **1**
c) **2**
d) **3**
e) **4**

Quiz: Question 25

- Assuming that **x** is a variable of type **int**, which values of **x** satisfy the following condition?

```
x % 2 == 1
```

a) no value
b) any value
c) any value less than **2**
d) any odd value
e) any even value

Quiz: Question 25

- Assuming that **x** is a variable of type **int**, which values of **x** satisfy the following condition?

```
x % 2 == 1
```

a) no value
b) any value
c) any value less than **2**
d) any odd value
e) any even value

Quiz: Question 26

- Assume that **x** is an integer in the range of 1 through 10 inclusively. Which of the following expressions can be used as a test for **x** being an even number?
  (Check all that apply!)

a) `x % 2 == 0`
b) `x / 2 > 1`
c) `x % 2 == 1`
d) `x / 2 * 2 == x`
e) `x==2 || x==4 || x==6 || x==8 || x==10`

Quiz: Question 26

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  (Check all that apply!)

a) `x % 2 == 0`
b) `x / 2 > 1`
c) `x % 2 == 1`
d) `x / 2 * 2 == x`
e) `x==2 || x==4 || x==6 || x==8 || x==10`

Quiz: Question 27

- Given the following program fragment, what is printed when it gets executed?

a) nothing
b) **0**
c) **10**
d) **20**
e) **30**

```
int i = 1;
int s = 0;
while (1)
  { i++;
    if (i >= 10)
       { break; }
    if (i % 2 == 1)
       { continue; }
    s += i;
   }
printf("%d", s);
```


Quiz: Question 27

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a) nothing
b) **0**
c) **10**
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e) **30**

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  { i++;
    if (i >= 10)
       { break; }
    if (i % 2 == 1)
       { continue; }
    s += i;
   }
printf("%d", s);
```

Quiz: Question 28

- Which of the following variable declarations is valid in ANSI-C?
  (Check all that apply!)
  a) `double xyz;`
  b) `double xy, z;`
  c) `double x = .1;`
  d) `double x = 1.1, y = 2.2, z = 3.3;`
  e) `double x,y,z = 1.0,2.0,3.0;`

Quiz: Question 28

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  (Check all that apply!)
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  c) `double x = .1;`
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  e) `double x,y,z = 1.0,2.0,3.0;`

Quiz: Question 29

- Which of the following data types has the largest range of representable numbers?
  a) `char`
  b) `short int`
  c) `long long int`
  d) `unsigned int`
  e) `signed long int`

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  a) `char`
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  c) `long long int`
  d) `unsigned int`
  e) `signed long int`

Quiz: Question 30

- Which of the following data types can store the greatest value?
  a) `long int`
  b) `long long int`
  c) `unsigned long long int`
  d) `float`
  e) `double`

Quiz: Question 30

- Which of the following data types can store the greatest value?
  a) `long int`
  b) `long long int`
  c) `unsigned long long int`
  d) `float`
  e) `double`