EECS 10: Computational Methods in Electrical and Computer Engineering

Lecture 18

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Lecture 18: Overview

- Review
  - Recursion
  - Structures, unions, enumerators
  - Binary data representation, memory
  - Pointers, pointer operations
  - String operations using pointers
  - File processing
  - Translation units
- Midterm Review Quiz
  - Top 5 “most difficult” questions
- Review Quiz

Midterm 2 Review Quiz

- Top 5 most "difficult" questions:
  - In the program below, what is the result of calling `grade(75)`?

a) `'A'`
b) `'B'`
c) `'C'`
d) `'D'`
e) `'F'`

```
1  char grade(int x)
2  { char g;
3    if (x > 90)
4      { g = 'A'; }
5    if (x > 80)
6      { g = 'B'; }
7    if (x > 70)
8      { g = 'C'; }
9    if (x > 60)
10     { g = 'D'; }
11   else
12     { g = 'F'; }
13   return g;
14 }
```


Midterm 2 Review Quiz

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Midterm 2 Review Quiz

- Top 5 most "difficult" questions:
  - In the program below, what is the result of calling `grade(80-90)`?

a) `'A'`
b) `'B'`
c) `'C'`
d) `'D'`
e) `'F'`

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1  char grade(int x)
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Midterm 2 Review Quiz

- Top 5 most "difficult" questions:
  - Which of the following are valid definitions of an integer array **A** of size 3? (Check all that apply!)

a) `int A[3];`
b) `int A[3] = {1,2,3};`
c) `int A[3] = {};`
d) `int A[3] = {1, 2};`
e) `int A[ ] = {1,2,3};`

Midterm 2 Review Quiz

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e) `int A[ ] = {1,2,3};`

Midterm 2 Review Quiz

- Top 5 most "difficult" questions:
  - Given two global variables **`int x=7`** and **`int y=8`**, which of the following functions properly swaps the values such that **`x=8`** and **`y=7`**? (Check all that apply!)

a)
```
void swap(int x, int y)
{ x = y; y = x;
}
```

b)
```
void swap(void)
{ x = y; y = x;
}
```

c)
```
void swap(void)
{ int t;
  t = x; x = y; y = t;
}
```

d)
```
void swap(void)
{ int t;
  t = y; y = x; x = t;
}
```

e)
```
void swap(int x, int y)
{ int t;
  t = x; x = y; y = t;
}
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c)
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void swap(void)
{ int t;
  t = x; x = y; y = t;
}
```

d)
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void swap(void)
{ int t;
  t = y; y = x; x = t;
}
```

e)
```
void swap(int x, int y)
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  t = x; x = y; y = t;
}
```

Midterm 2 Review Quiz

- Top 5 most "difficult" questions:
  - In the **`gdb`** debugger, which commands allow you to run your program step by step? (Check all that apply!)

a) **`step`**
b) **`cont`**
c) **`run`**
d) **`next`**
e) **`back`**

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b) **`cont`**
c) **`run`**
d) **`next`**
e) **`back`**

Quiz: Question 1

- In the program below, what is printed by the function call `g(1)`?

a) `1 2`
b) `2 3`
c) `1 1`
d) `2`
e) `1`

```
1  int f(int x)
2  { printf("%d ", x);
3    return x + 1;
4  }
5  int g(int x)
6  { printf("%d ", f(x));
7    return x + 2;
8  }
```


Quiz: Question 1

- In the program below, what is printed by the function call `g(1)`?

a) `1 2`
b) `2 3`
c) `1 1`
d) `2`
e) `1`

```
1  int f(int x)
2  { printf("%d ", x);
3    return x + 1;
4  }
5  int g(int x)
6  { printf("%d ", f(x));
7    return x + 2;
8  }
```

Quiz: Question 2

- What is recursion?
  (Check all that apply!)

a) A function that does not terminate.
b) A function that calls itself.
c) A function that contains a loop.
d) A function `f` that calls a function `g` which calls `f`.
e) A function that returns no value.

Quiz: Question 2

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d) A function `f` that calls a function `g` which calls `f`.
e) A function that returns no value.

Quiz: Question 3

- Given the function definition below, what is printed for the function call **`f(3)`**?

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

```
1 void f(int x)
2 {
3   printf("%d ", x);
4   if (x > 0)
5     { f(x-1); }
6 }
```


Quiz: Question 3

- Given the function definition below, what is printed for the function call **`f(3)`**?

a) 1 2 3
b) 1 2 3 4

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

```
1 void f(int x)
2 {
3   printf("%d ", x);
4   if (x > 0)
5     { f(x-1); }
6 }
```

Quiz: Question 4

- Given the following definition of the vectors **v1**, **v2** and **v3**, what is a correct way to perform a vector addition of **v1** and **v2**?

```
struct v {int x, y;} v1, v2, v3;
```

a)
```
v3 = v1 + v2;
```

b)
```
v3 = v1[x]*v2[y] + v1[y]*v2[x]
```

c)
```
v3[0] = v1[0] + v2[0];
v3[1] = v1[1] + v2[1];
```

d)
```
v3.x = v1.x + v2.x;
v3.y = v1.y + v2.y;
```

e)
```
v3->x = v1->x + v2->x;
v3->y = v1->y + v2->y;
```


Quiz: Question 4

- Given the following definition of the vectors **v1**, **v2** and **v3**, what is a correct way to perform a vector addition of **v1** and **v2**?

```
struct v {int x, y;} v1, v2, v3;
```

a)
```
v3 = v1 + v2;
```

b)
```
v3 = v1[x]*v2[y] + v1[y]*v2[x]
```

c)
```
v3[0] = v1[0] + v2[0];
v3[1] = v1[1] + v2[1];
```

d)
```
v3.x = v1.x + v2.x;
v3.y = v1.y + v2.y;
```

e)
```
v3->x = v1->x + v2->x;
v3->y = v1->y + v2->y;
```

Quiz: Question 5

- Given the following enumerator definition, what is printed by `printf("%d", two);`?

```
enum count {one, two, three, four = 4};
```

a) `one`
b) `two`
c) `three`
d) `1`
e) `2`

Quiz: Question 5

- Given the following enumerator definition, what is printed by `printf("%d", two);`?

```
enum count {one, two, three, four = 4};
```

a) `one`
b) `two`
c) `three`
d) `1`
e) `2`

Quiz: Question 6

- Which of the following components do you find in every computer? (Check all that apply!)

a) **ROM**
b) **RUM**
c) **BUG**
d) **CPU**
e) **IBM**

Quiz: Question 6

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a) **ROM**
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c) **BUG**
d) **CPU**
e) **IBM**

Quiz: Question 7

- What is the decimal value of the (unsigned) binary number 01010101_2 ?

a) `01010101`
b) `85`
c) `101`
d) `170`
e) `255`

Quiz: Question 7

- What is the decimal value of the (unsigned) binary number 01010101_2 ?

a) `01010101`
b) `85`
c) `101`
d) `170`
e) `255`

Quiz: Question 8

- What is the binary value of the hexadecimal number FF_{16} ?

a) `01010101`
b) `10001000`
c) `01110111`
d) `00010001`
e) `11111111`

Quiz: Question 8

- What is the binary value of the hexadecimal number FF_{16} ?

a) `01010101`
b) `10001000`
c) `01110111`
d) `00010001`
e) `11111111`

Quiz: Question 9

- How many bits do you need to represent one hexadecimal digit?

a) 1
b) 2
c) 4
d) 8
e) 16

Quiz: Question 9

- How many bits do you need to represent one hexadecimal digit?

a) 1
b) 2
c) 4
d) 8
e) 16

Quiz: Question 10

- What could cause a **`bus error`**? (Check all that apply!)

a) Waking up late and missing the bus.
b) Calling a recursive function.
c) Accessing an array with an index out of range.
d) Referencing a pointer variable with invalid value.
e) Accessing an integer variable with invalid value.

Quiz: Question 10

- What could cause a **`bus error`**? (Check all that apply!)

a) Waking up late and missing the bus.
b) Calling a recursive function.
c) Accessing an array with an index out of range.
d) Referencing a pointer variable with invalid value.
e) Accessing an integer variable with invalid value.

Quiz: Question 11

- In C, which properties does every object have?
(Check all that apply!)

a) A size.
b) A value.
c) A weight.
d) A type.
e) A location.

Quiz: Question 11

- In C, which properties does every object have?
(Check all that apply!)

a) A size.
b) A value.
c) A weight.
d) A type.
e) A location.

Quiz: Question 12

- Given the program segment below, what is the value of `*p` at the end?

a) **1**
b) **2**
c) **3**
d) **4**
e) **5**

```
1  int x[] = {1,2,3,4,5};
2  int *p = &x[2];
3
4  p++;
5  p -= 2;
```


Quiz: Question 12

- Given the program segment below, what is the value of `*p` at the end?

a) 1
b) **2**
c) 3
d) 4
e) 5

```
1  int x[] = {1,2,3,4,5};
2  int *p = &x[2];
3
4  p++;
5  p -= 2;
```

Quiz: Question 13

- Given the function and variable definitions shown below, which function call is valid? (Check all that apply!)

a) `StrLen(cp);`
b) `StrLen(ca);`
c) `StrLen(c);`
d) `StrLen(i);`
e) `StrLen("abc");`

```
1  int StrLen(
2        const char *s)
3  {  int l = 0;
4     while(*s)
5     { s++;
6       l++;
7     }
8     return l;
9  }
10 char *cp  = "hello";
11 char ca[] = "world";
12 char c = 'c';
13 int  i = 42;
```


Quiz: Question 13

- Given the function and variable definitions shown below, which function call is valid? (Check all that apply!)

a) `StrLen(cp);`
b) `StrLen(ca);`
c) `StrLen(c);`
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1  int StrLen(
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10 char *cp  = "hello";
11 char ca[] = "world";
12 char c = 'c';
13 int  i = 42;
```

Quiz: Question 14

- Which of the following are functions declared in **`stdio.h`**?
  (Check all that apply!)

a) **`printf`**
b) **`printd`**
c) **`fprintf`**
d) **`sprint`**
e) **`fputs`**

Quiz: Question 14

- Which of the following are functions declared in **`stdio.h`**?
  (Check all that apply!)

a) **`printf`**
b) **`printd`**
c) **`fprintf`**
d) **`sprint`**
e) **`fputs`**

Quiz: Question 15

- What does the following code segment print?

```
1 char s[] = "Hppe!Mvdl!boe!Ibqqz!Ipmjebzt";
2 char *p;
3 p = &s[0];
4 while(*p)
5 { printf("%c", *p - 1);
6   p++;
7 }
```

a) **Hppe!Mvdl!boe!Ibqqz!Ipmjebzt**
b) **Happy Holidays and Good Luck**
c) **Happy Luck and Good Holidays**
d) **Good Holidays and Happy Luck**
e) **Good Luck and Happy Holidays**

Quiz: Question 15

- What does the following code segment print?

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1 char s[] = "Hppe!Mvdl!boe!Ibqqz!Ipmjebzt";
2 char *p;
3 p = &s[0];
4 while(*p)
5 { printf("%c", *p - 1);
6   p++;
7 }
```

a) **Hppe!Mvdl!boe!Ibqqz!Ipmjebzt**
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c) **Happy Luck and Good Holidays**
d) **Good Holidays and Happy Luck**
e) **Good Luck and Happy Holidays**